RAILROAD GAZETTE

FRIDAY, FEBRUARY 7, 1902.

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Contributions

The Middletown (Conn.) Draw Bridge.

New Britain, Conn., Jan. 18, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

My attention has been called to an article in your edition of Dec. 27, page 889, "The Middletown (Conn.) Bridge, the Longest Highway Draw Span." In this article Mr. H. G. Tyrrell, C. E., assumes credit which does not belong to him, and the statement he makes that he is responsible for the "form and outline of both the draw and fixed spans, and to refigure and reproportion the members" is false and misleading.

At the time this bridge at Middletown was under construction, the writer was President and Chief Engineer of the Berlin Iron Bridge Company in name, but in fact, Mr. James H. Edwards, now Assistant Chief Engineer of the American Bridge Company, was then in form, as he was later in fact, the Chief Engineer of the company, and had charge of this work. Mr. Charles F. Chase, now Chief Engineer of the Berlin Construction Co., of Berlin, Conn., had charge, under Mr. Edwards, of all the calculations and proportioning of all the parts of this structure. The substructure was designed by Mr. Edwin D. Graves, now Chief Engineer of the Connecticut River Bridge and Highway District, at Hartford, Conn., and he also had charge of all the field work, being the resident engineer in charge. During this time Mr. Tyrrell was in the employ of the Berlin Iron Bridge Company as a draughtsman, and as such worked on some of the drawings for this structure. but that he is entitled to any credit whatever for the design, or for the execution of the work, is false, and any assumption on his part for such credit is wrong, and is not justified by the facts, and is unjust to Mr. Edwards, Mr. Chase and Mr. Graves.

I understand that Mr. Tyrrell has made similar statements to this in other engineering papers, and also in the public press, and it appears to the writer that it is time his statements were corrected and their falsity shown.

CHAS. M. JARVIS.

The Smoke Nuisance.

Cleveland, Jan. 20, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I have your paper of Jan. 10 with letter on the smoke nuisance by Mr. Burroughs. In reply, I would say that we regard this method of throwing the responsibility for the smoke on the engineer and fireman as working no hardship to the latter, and as furnishing the most immediate and prompt means of stopping the nuisance. It is no more difficult for the fireman to fire on the one-shovel system, after he gets accustomed to it, and it is thoroughly effective in preventing smoke, and in keeping up steam pressure, except when the engine is much overloaded. Under these last-named conditions, smoke cannot be avoided. Instead of the opening of the fire-door for an inch or two lowering the temperature in the fire-box, it will actually increase it and raise the steam pressure.

That this is a practical solution can be readily proved by referring to the experience of the roads which have tried it. I entirely agree with your correspondent that the best ultimate solution of the difficulty is the use of the mechanical stoker, if that is practicable. It will take a long time, however, to demonstrate the success of the stoker on the various roads, and in the meantime something must be done. The method adopted here has reduced the smoke to about one-third of that formerly produced, which is certainly a result worth striving for. The introduction of smokeless fuel, or of stokers, can meantime go on just as before, and we shall be glad to see this more permanent solution of the problem.

C. H. BENJAMIN, *Supervising Engineer.*

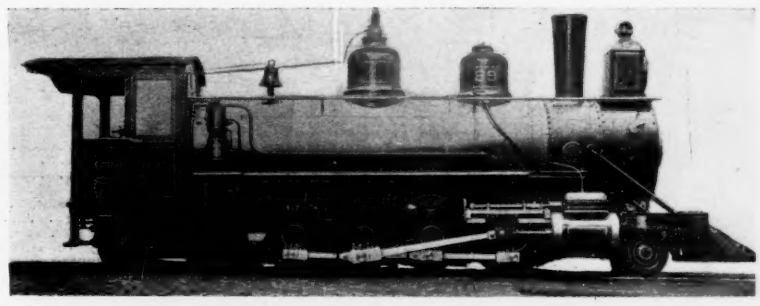
Consolidation Locomotive With Trailing Wheels.

Baldwin Locomotive Works, Philadelphia, Jan. 27, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

We have noted in your issue of Jan. 24, page 51, a letter from Mr. H. J. Gross, Second Vice-President of the American Locomotive Company, dated Jan. 13, calling attention to the construction of Consolidation locomotives with a rear pony truck, prior to the engine built by us for the Bismarck, Washburn & Great Falls Ry., illustrated on page 18 of your issue of the 10th inst.

We enclose herewith a photograph of one of a lot of locomotives built by us for the Interoceanic Railway of Mexico in November, 1890, embodying the arrangement of wheels referred to.



Baldwin Consolidation Locomotive With Trailing Wheels.

The application of a rear truck to a Consolidation engine is not new, but it will be noticed that the enclosed photograph, as well as that referred to by Mr. Gross, and described on page 51 of your issue of Jan. 24, shows an ordinary swinging truck, and there is no attempt made to get the increased grate area available by widening the fire-box beyond the frames. In the locomotive for the Bismarck, Washburn & Great Falls Railway, the trailing wheels under the firebox are provided with the Rushton patented device, giving radial motion.

In view of these additional facts, presented by Mr. Gross and by ourselves, we think that your statement about the Bismarck, Washburn & Great Falls locomotive, is correct, especially were you to add a note as to the fire-box arrangement also.

BURNHAM, WILLIAMS & CO.

An Eventful Bridge History.*

BY HUNTER M'DONALD, *Chief Engineer of the Nashville, Chattanooga & St. Louis Railway.*

The bridge of the Nashville, Chattanooga & St. Louis Railway over the Tennessee River at Johnsonville, Tenn., has had an eventful career, especially in the year 1901.

Prior to 1893 it consisted of seven spans of about 166 ft., one of 148 ft. and a draw 233 ft., measuring from centers of piers. In 1893 the old draw and one 166-ft. span were replaced by a new draw 399 ft. long resting on new masonry piers founded on pneumatic caissons resting on bed rock. At the same time the six other combination spans were strengthened and the entire bridge raised 4½ ft. to get above high water. The history of this work and the bridge was the subject of paper No. 744 presented by the writer to the Am. Soc. C. E.

In 1890 spans No. 4 and 6 were blown away by a cyclone, span No. 5 remaining on the piers, but slightly damaged. The water was very high and remained so for a long period, and it required 41 days to trestle the openings, one marine pile driver being employed. The last pile was driven with the stage of the river at 28 ft. and the water 53 ft. deep.

The year 1901 brought with it a chain of disasters. On Feb. 24 span No. 1 caught fire, on account of a sparrow's nest under the housing, and the water in the barrels being frozen, the span fell before the fire could be put out. The span was trestled, using an extension track driver, and traffic was resumed on the 28th. A contract for the renewal of the burnt span and the other five combination spans was at once closed with the Louisville Bridge & Iron Co., the work to be completed Jan. 1, 1902.

On account of delay in delivery of material the work was not begun until August. It was fortunate that it was not begun earlier, as there were two heavy floods in the river in the meantime. The piles in span No. 1 were driven very deep into the gravel bottom, and in some cases through old U. S. Transport hulls which were sunk there during the war by a battery under Capt. John W. Morton, of Gen. Forrest's Cavalry. This and the fact that it was the shore span and protected from drift wood enabled the false work to withstand these rises.

From Aug. 6 to 15 tremendous rains occurred on the upper water shed of the Tennessee River, causing all the streams to rise rapidly and doing much damage. The steel work of span No. 1 was nearly ready to swing off and span No. 2 had been trestled and the old bridge taken down when this flood reached Johnsonville. The river reached its maximum of 28 ft., on this rise, Aug. 24.

In spite of all efforts to save the false work of span No. 2, it went out at 3 p.m., Aug. 20, in a driving rain storm, the gage reading 22.6. Span No. 1, although the steel work had not been connected up, was again able to withstand the flood. Preparations were at once made to replace the trestle. The water was 43 ft. deep and the current about six miles an hour, with much drift running. Efforts to get a marine driver were unsuccessful and it was decided to use track drivers. The extreme distance from base of rail to the bottom of river was 68 ft. The piles were already on hand, but had to be spliced by means of a 6-ft. lap, bolted at frequent intervals, making them 78 ft. long. One extension driver was put to work at each end of the opening, driving 12½-ft. spans, ahead. In order to control the piles at the surface of the water, a float for each driver was built out of old bridge timber. They were 12 ft. wide and 32 ft. long. On the upper corner of each float an outrigger extending 12 ft. up the river was bolted. To the end of this outrigger was fastened a snatch block. These floats were lashed to the pier or bents on the back side and supported by lines from the bridge, and moved from bent to bent as the work progressed.

Each pile was hoisted clear of the water and a 1¼-in. line tied near the foot by a bow knot passed through the snatch block on the outrigger, and thence to the winch head on the driver. To the end of this line was attached a trigger line for releasing the foot line after the pile had been driven a short distance. By starting the pile some distance up stream and slacking the hoisting line and foot line together the piles were successfully lowered into correct position.

As soon as they struck bottom they began to vibrate back and forth in a most violent and discouraging manner and it was with great difficulty that they were steadied by lines sufficiently to admit of driving them and by braces after being driven. Of course, no bracing could be put on lower than the surface of the water. In this manner the trestle was completed and the traffic which had been suspended on the morning of Aug. 20 was resumed at 1:30 p.m. of the 25th.

This rise was the highest one known in August for 50 years. Fortunately no steel had been placed on the false work and none was lost.

The work of completion of the remaining spans was again taken up and pushed as vigorously as the health of the locality and heavy traffic would permit. As a general thing it is considered safe to have false work in the river as late as Jan. 1, but in order to guard against another unusual rise, it was decided to drive two six-pile bents in the sixth span, 60 ft. apart, and in case of a rise, of which we generally have about seven days' warning, to put in an old 60-ft. iron span, to let the driftwood through. This span was delivered and ready for erection.

By Dec. 14 all spans were completed, except the sixth, and this one was within about two days of completion. On the 13th and 14th very heavy rains fell on the upper water shed and at some points in Middle Tennessee. It was supposed that the rise would be about seven days in reaching the bridge. Between the 14th and 15th the temperature dropped from 55 deg. to — 6 and a terrible blizzard set in. No work on the bridge was done on the 14th and 15th on account of the ice and cold and the 15th being Sunday.

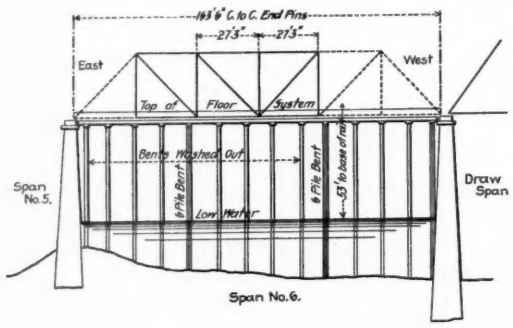
At 6 a.m., Dec. 14, the gage read 4.8, on Dec. 15 7.3, on the 16th 10.0, and on 17th 15.1, showing that the heavy rainfall was not confined to the upper water shed, but that the nearer streams had received a full supply. Work was resumed on the morning of the 16th in spite of the cold, the temperature being — 3. It was decided that the new work could be completed before the temporary span could be put in. One force of bridge men belonging to the railroad was moved to the bridge to keep off drift wood and strengthen the bracing. On the night of the 15th a large raft which had been loosened by the sudden rise struck the pier at the east end broadside, knocking the east half of the false work down stream about 6 in. and distorting the truss so as to make it impossible to drive the pins. At this time the two end braces at the east end and two top chord pieces and two end braces at the west end, together with their associated tension members were still to be put in.

The entire bridge force of the division was at once moved to the scene and organized into night and day gangs to fight drift wood and to assist in lining up the bridge so that the steel work could be completed.

They were unable to keep up with the rapidly running

*To be read at the Meeting of the Engineering Association of the South, Feb. 13.

drift wood and the span gradually worked further and further down stream. Traffic over the bridge was suspended at 7 a.m., Dec. 18, the gage reading 18.6. On the night of the 18th the men became uneasy about the structure and refused to work longer on the bridge or drift. On the next morning, however, work was resumed and the two east end braces gotten in position and temporary pins, 2½ in. in diam., were driven in all holes where the new pins could not be entered. All efforts were abandoned to complete the steel work and the bridge was keyed up hard on the six-pile bent on the west side with the forlorn hope that this might remain in while the bents east of it were slacked and cut out. The engraving shows in solid lines the members of the span in place at this time, and in dotted lines those to be put in. It will be noted that the six-pile bent, referred to above, was 3 ft. west of the vertical post at the panel point. The 12 x 12 longitudinal cap rails on which the cross floor beams rested were lashed up to the track between the six-pile



bent and the one just east of it so that they could assist the steel track stringers in transmitting the weight of the west end of the span to the six-pile bent. When everything was ready the wedges were withdrawn from the two bents next to the east pier, but they showed no tendency to move down stream.

About this time a steamer coming down the river blew for the draw to open and all the men left the threatened span. The steamer passed through the draw rapidly, making very high waves, which set the bank of drift wood in motion, causing the bents east of the six-pile bent to be carried out at once, and leaving the steel work intact above. The steel work immediately swung back into line, due to the resilience of the steel track stringers, which were riveted up for the entire span, and which, no doubt, assisted greatly in preventing the bridge from going out.

At this time the gage read 20.6 and the blizzard continued, the record for the period being as follows: 16th, —3; 17th, +5; 18th, —8; 19th, +5; 20th, —1; 21st, —2; 22nd, +45. Nearly all the time the wind was high and penetrating.

The bridge now being in line, the work of completing the steel work on the west end was resumed and completed by the evening of the 20th, all permanent pins being inserted over that part where the false work still remained in.

On the night of the 19th the men again became alarmed about the condition of the remaining false work and refused to go on the drift pile or bridge, confining their work of keeping off drift wood to what could be done in skiffs; the next morning, however, volunteers were called for to go on the drift pile and tie lines, place hooks and cut logs. Two young men, Carney Pavat and Moses Gartin, volunteered to go and it was but a short time before confidence was again restored and the men all in their usual places. It is needless to say that these two men, members of one of the railroad bridge forces, have been appropriately rewarded by promotion.

On the morning of the 20th it was decided to establish a river transfer for passengers and a steamboat left Paducah at 3 p.m. that day, bringing a barge to be used, in place of the floats previously described, in driving piles under the span, the use of these floats being deemed unsafe in freezing weather, as the water dashes over them continually. The boat was delayed by ice and did not arrive until 5 p.m. the 21st. In the meantime swinging pile drivers were put in place on the crippled span and nine 80-ft. piles were delivered. The barge was only 18 ft. wide, and as the panel points under which the three new bents were to be driven were 27 ft. apart it was necessary to put outriggers and a waling strip on the barge in order to give the proper spacing. Pile driving began at noon of the 22nd with gage reading 22.8, and the water 48 ft. deep. By night all efforts had failed to get a single pile driven.

The next day work was resumed with better success, and as the bents were driven the steel was wedged up and permanent pins substituted for the temporary ones. By the night of the 24th all the piles were driven and capped and all pins driven except three. It was decided to start all trains on schedule time at 11:30 p.m., expecting the bridge to be completed in time for them to cross.

At 2 a.m., after continued efforts to assemble the members so that the pins could be entered, two in the top chord still remained to be driven. Investigation with a torch finally revealed two rivet heads inside of the top chord which should have had flat heads, but which had been overlooked. These were at once cut out and the pins driven, and the trains crossed at 8 a.m., Dec. 25, the men of the Louisville Bridge & Iron Co. having been on continuous duty for 26 hours.

The hardships endured by the men during this entire struggle cannot be expressed in words, but to their bravery and zeal and devotion to the interests of their employers is due, almost as much as to good luck, the saving of the span. Zero weather in this climate is a rare occurrence and always brings suffering with it, and a general suspension of work.

It is probable that no new bridge ever came nearer a watery grave and escaped.

On Christmas Day the 120-ton consolidation engines made their first trips over the Division between Nashville and Union City.

Automatic Block Signals—65 Per Cent. Increase.

From information just gathered it appears that the length of railroad in America equipped with block signals is now no less than 3,347 miles (including 22 miles in Canada). One year ago, when we published our detailed table, showing both automatic and non-automatic block signaling throughout the country, the number of miles of automatic was less than 2,300; so that the increase during the year has been nearly 50 per cent.; and there is enough new work now under construction, or soon to be built, to make a total of over 4,000 miles, which is about 65 per cent. more than the actual mileage in use at the end of 1900. The mileage on the several roads at the present time is as follows:

Automatic Block Signals, January, 1902.

	Miles of road.
Atchison, Topeka & Santa Fe	24
Baltimore & Ohio	94½
Boston & Albany	146
Boston & Maine	135
Canadian Pacific	16
Central of New Jersey	143
Chicago & Alton	39
Chicago, Burlington & Quincy	25
Chicago & Eastern Illinois	8
Chicago, Milwaukee & St. Paul	7
Chicago & North Western	196½
Chicago Terminal Transfer	4½
Chicago, Rock Island & Pacific	15
Chicago, St. Paul, Minneapolis & Omaha	4
Cincinnati, New Orleans & Texas Pacific	229
Delaware & Hudson	38
Delaware, Lackawanna & Western	258
Erie & Wyoming Valley	2
Grand Trunk	6
Illinois Central	87
Lake Shore & Michigan Southern	40
Lehigh Valley	470
Los Angeles Terminal	2
Metropolitan West Side Elevated (Chicago)	3
Michigan Central	213
New York Central & Hudson River	78
New York, New Haven & Hartford	251
New York, Ontario & Western	64
Norfolk & Western	1
Oregon Short Line	23
Pennsylvania	208½
Pennsylvania Lines West of Pittsburgh	35
Philadelphia & Reading	282½
Philadelphia & Reading (Atlantic City Division)	55½
Pittsburgh & Lake Erie	10
South Side Elevated (Chicago)	9
Southern	11
Southern Pacific	76
St. Louis, Keokuk & Northwestern	16
St. Louis & San Francisco	4
Staten Island Rapid Transit	9
Union Pacific	15
	3,354

The comparisons outlined in the foregoing paragraph appear, when put in tabular form, as follows:

	Miles.
Total of table of Jan. 11, 1901	2,295
Deduct for duplication	7
	2,288
Add for error (Boston & Maine)	127
Total, January, 1901	2,415
Total, January, 1902, as shown by roads above	3,354
Deduct for duplication (C., R. I. & P. and L. S. & M. S.)	7
Total, January, 1902	3,347
To be built in 1902	653
	4,000

The roads on which work is to be done this year are the

Boston & Maine,
Chicago & Alton,
Chicago & Eastern Illinois,
Chicago, Milwaukee & St. Paul,
Chicago & North Western,
Cincinnati, New Orleans & Texas Pacific,
Delaware, Lackawanna & Western,
Illinois Central,
Long Island,
New York, Ontario & Western,
Pennsylvania,
Pennsylvania Lines West of Pittsburgh,
Pittsburgh & Lake Erie,
Southern Pacific.

The Chicago & Alton and the Illinois Central have just let contracts for important sections of road. The first-named road will have some signals arranged normal-clear and some normal-danger, the former to be put up by the Union Switch & Signal Company, and the latter by the Hall Signal Company. The Union signals are to be installed in a number of short sections, between Roodhouse and Kansas City; and the Hall signals, also in detached sections, between Roodhouse and Godfrey; Godfrey and Wann; Bloomington and Roodhouse, and on the Coal City branch. The new work on the Chicago & Eastern Illinois consists of the Miller Locomotive Cab Signal, heretofore noticed in these columns. A note concerning the Chicago & North Western contract of nearly 100 miles was given in our news columns Jan. 24. The Delaware, Lackawanna & Western expects to equip this year no less than 189 miles of track, which represents 45 miles of single track line and 72 miles of double. The Pennsylvania, which has been extending the electro-pneumatic system every year recently, expects this year to equip 50 miles more with that system. The Pittsburgh & Lake Erie contract, for 85 miles, let to the Union Switch & Signal Company, has already been noted in these columns. The Long Island road has contracted with the Union Switch & Signal Company for the equipment of eight miles of double-track road with automatic semaphore signals, to be worked by electric motors.

Concerning the Dangers of Electrical Traction.

We have received copies of letters lately written by Mr. Frank J. Sprague to various papers, taking up the matter of the dangers in electric traction to which Mr. Westinghouse lately called public attention, and we are reminded that in common justice we ought to present the other side to our readers. We have no particular axe to grind in this matter and are only after the truth, and therefore very willingly print Mr. Sprague's statements, omitting that which seems least relevant or unnecessarily personal.

"An unhappy accident in the New York Central tunnel has, because of its appalling consequences, appealed most strongly to popular feeling and prejudice. It is not my present purpose to discuss the causes of this accident, to try the apportionment of blame, or to point out what I may think are the proper remedies, but Mr. Westinghouse's comments are properly subjects for criticism and correction.

"Although the official announcement of the company's plans, as far as described, detail no specific method of electrical operation, Mr. Westinghouse assumes that it is proposed to move all trains by motors attached to 'several cars of each train.' The plan thus indefinitely referred to is what is known as the 'multiple unit system,' was first introduced by me on the South Side Elevated of Chicago, four years ago, and is now the generally accepted method of train operation for certain classes of service. It is a method of train control and operation by means of which locomotives or cars, each equipped with motors and controllers individual to these motors, can be aggregated at will, with or without other cars unequipped with motors, into train combinations of any length, and controllable from any desired point. . . . That the multiple unit system, already indorsed by 300,000 h.p. of equipment within four years, is an essential in any general solution of many railroad problems of to-day goes without saying, but it is equally certain that modified or alternative plans must be applied to other problems.

"Mr. Westinghouse declares that already there have been many serious collisions on electric cars, with great loss of life. It would have been more to the point if he had explained that almost invariably these have been with single cars on single track roads where no adequate signals were in operation, or where they were ignored. Where there have been collisions between trains on electrically operated elevated roads, the cause has been fog, and absence or disregard of signals, and the loss of life has been a minimum. In no case has such a collision caused a conflagration, this last, when it has occurred, having been on account of defective work. There is less reason why fires should occur on well-equipped multiple unit operated trains than on single cars in the streets, for it is undeniably true that much greater care has, at least in some cases, been exercised to create fire- and fool-proof apparatus.

"The statement is also advanced that the amount of current necessary to operate a train would melt a large bar of iron. So, too, would the amount of current necessary to light an ordinary building, but an essential of the multiple unit system is the localization on any motor car of controlling apparatus individual to its motors, and limited in current to their capacity. No controlling device in this system carries the entire current of the train. heavy currents are especially prohibited being carried from one car to another, and the controlling currents are less than those in an ordinary lamp circuit. Ignorance and carelessness of motormen is largely discounted, in that the current in-put in each motor equipment is, where the system is properly installed, automatically limited to absolutely safe amounts. Where derangement of a circuit occurs, causing an abnormal increase of current, safety devices of reliable character provide against its continuance. . . .

I have not the slightest hesitation in saying that every train movement in the tunnel and at the Grand Central terminus can be efficiently, promptly and safely made under electrical operation. And if it be true, which I do not think it is, that no electrical manufacturer would undertake such a contract, then it is proper to say that there are contracting and constructing engineers who would not hesitate to assume the task. . . .

"The real problems before the Central management are not alone operative ones, intensified by limited track room, lack of storage space, and consequent congestion of movement, but also those of civil engineering. The proposal to loop the suburban tracks, no matter how the trains are operated, is commendable in the highest degree. But it is certain that such a loop will be operated electrically, and the natural corollary is that the electrical operation will be eventually carried beyond the limits of the tunnel, at least as to the normal operation of these trains, in which case multiple unit operation, possibly with cars of new construction, will most likely be adopted.

"Another problem is the handling of existing trains

undisturbed in make-up or equipment, hauled to some point within reasonable radius of the Grand Central station by steam. It is clear that for this terminal work the motors will not be distributed under passenger cars.

"It is reported that Mr. Yerkes intends to introduce on the Metropolitan-District Railway of London an improved type of car. I doubt not that this is so, and that it will be made just as strong, and as free from the possibilities of damage by collision and by fire as it is practical to make it, that steel construction for at least the under body of the car will be adopted, but more for structural purposes than because of electrical dangers. In this connection it is proper to point out that most modern cars on the Continent of Europe are so built to-day, and the cars on the Versailles Division of the Western Railroad of France operated on the multiple unit plan are constructed in this fashion. It is also likely that some parts of the upper structure may be made of steel, and other parts of wood or other material treated so as to be non-inflammable, the same as is now required on our battleships.

"The ordinary possibilities of fire on an electric car may be briefly summarized under three heads: Flashing at the contact shoes, which, being carried on an all-steel truck, may be now discounted; breaking of connections or chafing of wires extending from the motors on the truck to the controlling apparatus on a car, caused by frequent and extreme movements of pivoted trucks, which can be avoided largely by good construction, and, so far as the car is concerned, by proper sheathing; and the making and breaking of current in the main motor controllers. Special insulation is essential in the running of circuits, and it must be provided either naturally in the car construction, or by special precautions, whether the car be of wood or steel, more in the latter case. It goes almost without saying that the controlling apparatus itself may, and should be, so constructed that no matter what the internal trouble, or what the amount of arcing due to bad or misplaced contacts, the disturbance shall be entirely local, and shall be kept so by being enclosed in an iron-clad structure.

"Common sense and prudence then indicate that whatever improvements in car construction may be introduced in the progress of the art, the first essential is to make the apparatus itself which controls motors reliable and fire-proof, and then to protect its installation, and the installation of the motor equipment by the best methods known to the art to-day. It is safe to say that when this precaution is taken the operation of the electrical train is amply safe.

"The presence of wood of itself is oftentimes a matter of safety rather than danger in electrical construction, because when properly protected it is not only a good insulator, and therefore avoids one of the initial possibilities of electrical trouble, but, properly sheathed with fire-proof material, the risk from its use is reduced to a minimum. On account of the use of the grounded circuit, the presence of steel renders less possible the absolute isolation of different parts of the electrical equipment, and can introduce possibilities of trouble which are foreign to some other construction. . . .

"Really if all that is predicted is in any measure true, if it is impossible for all practical purposes to protect existing cars so that they may be safely operated electrically, then the 50,000 railroad cars in this country would better be pitched into the scrap heap, the Manhattan, Brooklyn, Boston and Chicago Elevated Railroads would better replace their wooden ties and do away with guard rails, or go back to steam, electrical science turn backward and horses and the cable be restored to their former pre-eminence."

New St. Lawrence Bridge at Montreal.

The Montreal Bridge Company has made a contract with the Atlas Construction Company, of New York, to build the Royal Albert Bridge, which is to span the St. Lawrence River from Montreal to Longueuil. In taking over this contract the construction company has bought all the interests which were held by C. N. Armstrong, and which have been mentioned at various times in the *Railroad Gazette*.

The company expects to begin work on the bridge as soon as subsidies become available. The estimated cost of the structure, with its terminals, is $10,000,000. These subsidies are: $1,000,000 from the Dominion Government; $1,000,000 from the City of Montreal; $500,000 from the Province and $500,000 from the counties on the south shore of the St. Lawrence.

The total length of the bridge will be 8,800 ft. The main span, a cantilever, will be 1,260 ft. long. The height of the bridge above water will be 150 ft., and its width 83 ft., divided as follows: A double-track railroad, 26 ft.; a double-track electric railroad, 22 ft.; a double highway, 23 ft., and two sidewalks, 12 ft. The weight of steel in the structure will be about 74,000,000 lbs., and there will be 90,000 cu. yds. of masonry.

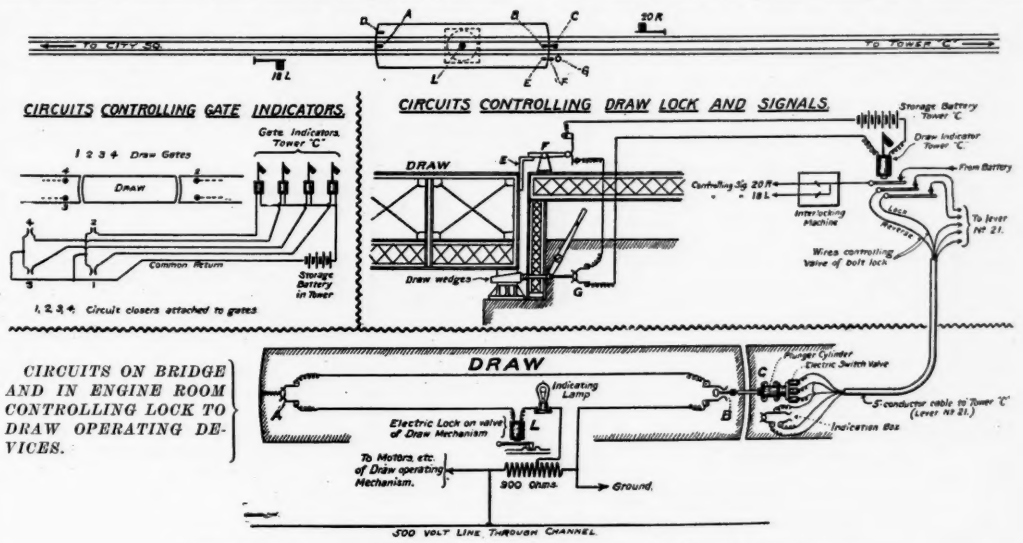
The Atlas Construction Company was incorporated on Jan. 25, under the laws of New Jersey, with a capital of $1,000,000. The directors are: Frederick Snare, of the contracting firm of Snare & Triest, New York; E. F. C. Young, President of the First National Bank of Jersey City; Henry Chapin, Vice-President of the National Bank of North America; Frank B. Schenck, President of the Mercantile National Bank; Charles D. Makepeace, Secretary to the Manhattan Trust Company; W. G. Triest, H. M. Dunn and Theodore L. Frothingham, an attorney, of No. 32 Liberty street, New York. Mr. Snare is President, Mr. Makepeace Secretary and Mr. Dunn Treasurer.

At present there are two bridges across the St. Lawrence at Montreal, the Victoria Bridge, owned by the Grand Trunk Railway, and the Lachine Bridge, owned by the Canadian Pacific Railway. Such other roads as enter Montreal over either bridge must pay toll. The new bridge, it is said, will effect a saving of more than 20 miles for all roads now entering Montreal from the south.

Electric Locking of the Charles River Drawbridge.

The Charles River drawbridge is an important feature in the line of the Boston Elevated Railroad between the Haymarket Square and the City Square stations. The situation of this bridge and its relations, in a general way, to the operating conditions of the road, were shown in the diagram given with our account of the signaling on the Boston Elevated, published last June (p. 462). The diagram now shown explains the way in which the movement and the locking of the bridge are brought within the convenient control of the signalman at the junction tower (Tower C) next south of the draw.

Attached to the drawbridge is a circuit controller that establishes a contact, controlling the draw signals only when the draw is in proper position, both with respect to its vertical and its horizontal alignment. In series with this contact is another which insures the proper position


TO CITY SQ.
TO TOWER "C"
18 L
20 R
CIRCUITS CONTROLLING GATE INDICATORS.
1 2 3 4 Draw Gates
Gate Indicators Tower "C"
DRAW
Common Return
Storage Battery in Tower
1, 2, 3, 4. Circuit closers attached to gates
CIRCUITS CONTROLLING DRAW LOCK AND SIGNALS.
Storage Battery Tower "C"
Draw Indicator Tower "C"
From Battery
Interlocking Machine
To lever No. 21.
Wires controlling Valve of bolt lock
Draw wedges
CIRCUITS ON BRIDGE AND IN ENGINE ROOM CONTROLLING LOCK TO DRAW OPERATING DEVICES.
DRAW
Indicating Lamp
Plunger Cylinder
Electric Switch Valve
5-conductor cable to Tower "C" (Lever No. 21.)
Indication Box
Electric Lock on valve of Draw Mechanism
To Motors, etc. of Draw operating Mechanism.
900 Ohms.
Ground.
500 VOLT LINE THROUGH CHANNEL

Electric Locking for Charles River Drawbridge—Boston Elevated Railway.

of the wedges supporting the draw ends before the closure of the contact is possible.

When these contacts are established, an indicator in Tower C gives notice of the fact, and the signalman may then lock the draw, whereupon the signals governing train movements over the draw, being released in the interlocking machine, may be cleared.

Before the draw lock can be again released all signals governing movements over the bridge must be put in the stop position, the latter act releasing mechanically the lever controlling the draw lock. The draw lock, when withdrawn, closes a local circuit which releases the draw tender's gearing for turning the bridge.

Complete interlocking mechanism thus exists between the draw operating mechanism and the draw signaling apparatus, and the two operators, though widely separated, work together in harmony and safety.

The principal functions of the apparatus are described in the illustration. The meaning of the reference letters is as follows:

A, B, Circuit closer and bridge bolt keeper.
C, Electro-pneumatic bridge lock plunger.
D, E, Brackets operating F.
F, Bridge alignment circuit closer.
G, Circuit closer on wedges of bridge.
L, Electric lock on valve of draw mechanism.
18 L, 20 R, Bridge signals.

The apparatus was put in by the Union Switch & Signal Company.

Annual Report of Interstate Commerce Commission.

The abstract of the annual report of the Interstate Commerce Commission, as sent out by the Secretary of the Commission, was given, nearly in full, in our issue of Jan. 31. Herewith we give notes of a number of the court decisions which are spoken of in the full report, but which did not appear in the abstract.

The complaint of coal dealers at Cincinnati, concerning discrimination in rates on coal from West Virginia, has been settled out of court. This suit was by coal merchants who were able to show that other coal merchants had received secret reductions in railroad rates. The settlement was brought about by the railroad company buying certain real estate of the complainants.

The United States Circuit Court for Northern Illinois, in the suit of Lundquist against the Grand Trunk, refused to countenance the business of forwarding agents, who gathered small shipments of freight and put them together into carload shipments, and then made money by securing from the railroad a carload rate. Lundquist asked for an injunction to compel the Grand Trunk to receive his carloads, but the injunction was refused. He claimed that the road was discriminating against him, as compared with other shippers who sent carload lots; but the court holds that a railroad cannot be compelled to thus undermine its own business. A forwarding agent, not being subject to the Interstate Commerce law, can make secret rates to a part of his shippers, if he sees fit, and thus really violate the law. In connection with this decision it is to be noted that the English courts have decided questions of this kind the other way.

The United States Court for Western Arkansas has decided that freight carried from a point in Arkansas through an adjoining state, or territory, and back into Arkansas, is subject to Federal regulation. A number of decisions are quoted to sustain this view. Those decisions in which, during the past few years, this question has been decided the other way are based on the decision of the Federal Court in the case of Lehigh Valley vs. Pennsylvania; but it is pointed out, in the present decision, that the Lehigh Valley case did not involve the question of regulation of traffic. It dealt only with the question of taxation by a State on the earnings of the railroad.

In a suit concerning the legality of ticket brokerage, a Texas court has given a decision exactly opposite to that given by the courts of New York on this subject. The Texas court sustains the law which forbids the sale of tickets except by authorized agents of the railroad.

The United States Supreme Court, in a case of the Western Union Telegraph Company against a publisher in Nebraska, has decided that there is a Federal common law. This does not mean that there is a body of Federal statutes, which can bear this interpretation, but that the principles of the common law apply, in such matters as interstate commerce, except as regards subjects which Congress has dealt with by legislation. The Interstate Commerce Commission calls attention to this decision as sustaining the right to prosecute an interstate carrier for wrongful acts, without regard to whether there is or is not a Federal statute touching such acts.

A suit for damages for personal injury has recently been decided by the State courts of Illinois, in which the Safety Appliance Act was a factor in determining the liability of a railroad company. The case is known as Hood vs. T. H. & I. The plaintiff, a freight brakeman, while coupling cars, on a dark night, slipped and fell under one of the cars, and as a result received serious injuries. He established to the satisfaction of the jury that the car which crushed his hand was not equipped with grab irons, as required by the Act of Congress. Without the benefit of that Act he could not have recovered, as the injury would have otherwise been held to be one of the risks incident to his employment. The Appellate Court of Illinois held, first, that to bring such a case within the operation of the Act of Congress it was not necessary to show that the car contained goods constituting interstate shipment. It was sufficient in that respect to show that the car in question was a part of a train engaged in interstate commerce, and that the car was attached to the train at East St. Louis, Ill., and was billed through to Indianapolis, Ind.; and that it was not provided with hand holds as required by the law. Second, the court held that it made no difference whether the employee did or did not know that the car was not provided with hand holds, as Section 8 of the Act of Congress expressly relieved him from the common law rule concerning the assumption of risks of knowledge and employment.

In this case the Appellate Court affirmed the judgment of the trial court which held the company liable. The State Court upheld and enforced the Federal statute, and gave it that liberal interpretation which prevails in the interpretation of remedial statutes.

As this is perhaps the first case in which Sections 4 and 8 of the Act have come before an Appellate Court, the decision as a precedent is most important to all concerned.

Another case, which, if sustained will have an important bearing upon the value of the safety appliance law to railroad employees is that of White vs. The Chicago Great Western, recently decided by the

United States Circuit Court for the Southern District of Iowa, which reached that Court on a removal from the State Court.

The case involved the application and construction of a statute of Iowa, one section of which is quite similar to the second section of the Federal statute here under discussion. Each statute prohibits the use of any *car* not equipped with automatic couplers, so that they may be coupled or uncoupled without the necessity of a trainman going between the cars. The plaintiff, White, was injured while attempting to make a coupling between a car that was properly equipped in accordance with the provisions of both the State and Federal law, and the tender of an engine that was not provided with automatic appliances, which necessitated the use of the old link and pin; while endeavoring to make that coupling he was crushed. The United States Circuit Court instructed the jury to return a verdict for the railroad company, on the ground that a locomotive tender was not a car, within the meaning of the Act.

As the State and Federal acts are substantially similar that Court would undoubtedly construe the Federal statute as not broad enough to require the locomotive and tender to be equipped with safety couplers. If that construction shall be upheld by the Supreme Court, the Safety Appliance Act will be considerably impaired in its practical value. It is, therefore, recommended that Section 2 of the Act be amended so as to specifically include locomotives and tenders. Indeed, such an amendment is necessary to put the statute in accord with the approved practice of all the prominent railroads.

The Isthmian Canal.

At one of the monthly banquets of the Chicago Commercial Club, held Saturday evening, Jan. 25, Mr. George S. Morison, a member of the Isthmian Canal Commission, made the address of the evening, taking as his subject the Isthmian Canal. This will shortly be published in full by the club; but meantime we are permitted to make some extracts from the address, as below:

. . . The principal feature of the Isthmian Canal, I think, may be said to be that it is not a canal in the usual sense. It is built, not to make canal navigation, not to increase navigation, but to reduce navigation. It is the formation of a short strait connecting two oceans. We have in this neighborhood another instance precisely like it, of a short canal connecting two seas, Lake Superior and Lake Huron, which now carries the heaviest tonnage that any canal ever has carried in the world; and it carries it, not because it is a canal, but in spite of its being a canal. It carries it because it is the only way of getting from one lake to the other.

If you will study the geography of the world, you will see that there is a very marked difference in the formation of the two continents. The Eastern Continent is broad from east to west; the Western Continent is long from north to south. The Eastern Continent has been completely circumnavigated. The passage around the Cape of Good Hope is a very easy passage, frequently made. The Western Continent has never been circumnavigated, and although the dream of a northeast passage has been a most enticing thing for centuries, it has had to be given up. Cape Horn is practically 20 degrees farther south than the Cape of Good Hope. Its passage is a very difficult one, especially in the winter season. The attraction of the Isthmian Canal is that it will avoid the necessity of circumnavigating this Continent. In spite of its being a canal, it will make ocean navigation a great deal easier than it is now. The Suez Canal has done this for the other Continent, where the difficulties of getting around the Continent were very much less. It remains to be seen what a canal across the American Isthmus will do. But its position and its importance is not because it is a canal, but in spite of its being a canal; a strait 20 miles wide would be a great deal better, but we cannot make it. . . .

We are particularly familiar here with the great change which has taken place in railroad rolling stock, and the enormous difference in train loads. The present economical railroad transportation is due to heavy locomotives, to heavy rails which carry them, and to cars which can carry heavy loads themselves. Instead of cars carrying 10 tons, as we had 30 years ago, we have plenty of cars carrying 50 tons, and they are sometimes loaded to 60. The same thing has taken place on the ocean. There are fleets of steamers crossing the Atlantic which carry 12,000 tons of cargo. There is at least one ship running to New York, and there are others building, which, when fully loaded, would carry 20,000 tons of cargo. . . .

It is these conditions, these increased dimensions, which have rendered ocean transportation as economical as it is. We have seen the same thing in this country. We have had railroads reducing their cost of transportation, we have had ocean steamers reducing their cost, and lake steamers have reduced it: the one trouble has been on the Mississippi River, and its tributaries, which have not been able to reduce it: and what has been the result? The railroads have taken all the transportation away from the rivers, except that class which can be carried without power, cargoes of coal and grain which can be taken down the Mississippi River because the current of the Mississippi River takes them down: but no considerable amount of freight can be brought back.

I have spent more time on this point than I had intended to; but I wanted to speak of it particularly, because the route across the Isthmus which was best adapted to the light transportation of the past may be very poorly adapted to the transportation of the future.

The Nicaragua route has been favored, especially in America, for a great many years. Lake Nicaragua itself is but 12 miles from the Pacific, and the Continental Divide is between the Lake and the Pacific. The drainage of the Lake is into the Atlantic. Near the western end of Lake Nicaragua is the old City of Granada. In early times ships used to sail from Spain to Granada. They passed up the San Juan River, landed their cargoes at Granada, took their return cargoes and went back. I do not know how big those ships were, but they probably were about the same dimensions as the caravels which we saw here at the World's Fair a few years ago.

The transit company which operated a line from New York to San Francisco by way of Lake Nicaragua had steamers of about the size that then crossed the Atlantic. They would sail from New York, anchor in Greytown Harbor, which was then a good harbor, although it has now disappeared, would transfer the passengers to river boats that came alongside. The river boat would go up the San Juan River to Castillo, where its passengers would get out and walk about a quarter of a mile around some rapids, take another boat which took them to the Lake and across the Lake and landed them within 12 miles of the Pacific, where a good stage road would take them in two hours to San Juan del Sur, where a steamer would be waiting for them. It seemed as if the San Juan River and Lake Nicaragua were an extension of the Atlantic Ocean, and that all that had to be done was to build a short canal between the Lake and the Pacific and to improve the navigation of the river. . . . The one thing which was not seen at first, and which meant a great deal, but which means a great deal more now than it did then, was the fact that the San Juan River was but 100 miles long, and 100 ft. higher at one end than at the other. It is a big river; it is as big as the Mississippi is at Dubuque. It looks like a river which could easily be improved. But no river can have a fall of one foot to the mile without having very serious obstructions in it to navigation. . . . While it might have been possible to maintain a 17-foot channel, it would not have been possible to maintain a 35-foot. channel. . . .

During the next 15 years, the first change took place. Greytown Harbor disappeared, and the last steamer that came to Greytown, landed its passengers outside the bar, where they were brought in by small boats and taken up the river. . . .

When the Nicaragua Canal Commission was appointed, it was charged only with an examination of the Nicaragua location, and it made more complete surveys, though not by any means as complete as have now been made. They . . . planned a canal nearly 50 miles long from the San Juan to the sea.

The plans of the present Commission are on the same lines, although the details have been very much improved. A better site has been found for the dam: it is further up stream, and it has a better bottom. The canal between the improved San Juan and the sea continues a portion of the scheme. It is this problem of constructing a canal nearly 50 miles long between the San Juan River and the ocean, not across the summit, but parallel to a river which cannot be made navigable, which has led to the increase in the estimates, and the increase in the apparent difficulties of the Nicaragua line. . . .

The principal problems to be met in the construction of the Nicaragua Canal are the artificial harbors, which do not present unusual difficulties, but they must be made before much work can be done: the 50 miles of canal mostly through the swamp, but the upper portion of which involves some extremely heavy excavation, and finally the regulation of the Lake. Lake Nicaragua furnishes an indefinite amount of water for a summit level supply. It furnishes almost too much water. It is so great a supply that the water used by the canal is immaterial in proportion to that required for evaporation. The difficulties lie in keeping the lake within reasonable limits, holding it high enough at the end of each wet season to prevent evaporation bringing it too low at the end of the dry season: this difficulty will be better understood when it is remembered that there have been times, when two dry seasons had a comparatively dry wet season between them, when for 18 months the amount of evaporation exceeded the entire inflow into the canal. This regulation can be done. It has been worked out in a perfectly satisfactory way. The defect about it is that it will require constant and careful watching. The discharge of the river is large. It may possibly run up as high as 200,000 cu. ft. a second; but it would be regulated artificially by a system of sluices, which must be managed, closed and opened at the right times. This is nothing that has not been done successfully elsewhere. But I think that there is no doubt to-day, that if we had the same problem before us that we had 50 years ago, and certainly if we had the one that we had a hundred years ago, to supply a waterway by which small vessels could go from ocean to ocean, Nicaragua would be the best route.

At Panama the situation is entirely different. The two oceans are only a little more than 30 miles apart in a straight line. There is no intermediate navigation, unless you can call the old canoe navigation of the Chagres River, navigated by boats drawing perhaps a foot, navigation. The advantage of this location is that it is the only place where the oceans approach near together, and the summit is within reasonable height. The summit of Nicaragua, the lowest known, is about 150 ft. above tidewater. The summit at Panama at the lowest point, is a little less than 300 ft. On the line of the canal it is somewhat more than 300. There are other points on the Isthmus, east of Panama, where the width of the Isthmus is less than at Panama, but a careful examination along the line of the whole backbone shows that no place can be found where the height of the ridge is not more than double what it is at Panama. There is practically no place where the Isthmus can be crossed, except at Nicaragua and Panama, without the use of a tunnel; and while some people may not hesitate to send ships through a tunnel, I do.

At Panama the Divide is about 10 miles from the Pacific. The actual length of the canal from shore to shore is a little more than 40 miles. The actual length from deep water to deep water is about 49 miles. There are two problems which have been the difficult ones at Panama. One is the Culebra cut, the other is the Chagres River.

When the French company began its work there, its people went at it with a magnificent and heroic ignorance. They proposed to cut a sea level canal, and to consider what they would do with other things afterwards. . . . The problem of the control of the Chagres is to prevent the floods doing any harm. That problem has been perfectly solved by our Commission. The first thing is to build a dam across the Chagres and convert nearly 20 miles of the river into a lake, that lake to be of such dimensions that no flood will produce a current in it which would do any harm. The surveys and examinations show that this is perfectly feasible: such a lake will form the summit level of the canal at an elevation varying between 85 and 90 ft., or about 15 ft. lower than Lake Nicaragua, in which no current would be strong enough to do any harm, and which would ordinarily be a perfectly quiet lake in which navigation would be as easy as in Lake Nicaragua. A location has also been found at some distance from the Chagres where a masonry spill-way can be built, over which the lake will discharge in flood times, and the rate at which it would be discharged can be easily calculated. It is not probable that the flood water over that spill-way would ever be over five ft. high, and the water can be taken from that spill-way to the sea without coming into the canal in the whole distance. I have seldom seen a problem more satisfactorily solved than this has been. Furthermore, the lake is to be large enough to supply, acting as a reservoir, the water needed for the summit level during the dry season when the river does not furnish enough. The whole solution, though an artificial one, is absolutely simple, and it will be entirely automatic when done. . . .

The Culebra cut is about eight miles long; it is heavy work for about seven of those eight miles, but it is exceptionally heavy only for one. The cut will be about 280 ft. deep, and the work remaining to take out of it is about 40,000,000 cu. yards. That has been one of the bug-bears of the Panama Canal.

The new French company, since the failure of the old one, has excavated a narrow slice in this cut, for more than two-thirds its depth, and has shown what the material is. It reminded me very much of material that I had taken out myself up in North Dakota. It is a very hard clay which costs as much to work perhaps as rock, but which weathers more or less when it is exposed. But it is a perfectly stable material, and the troubles which have been reported of sliding soil, etc., are only on the surface well above anything remaining to be done. . .

These are brief descriptions of the two canals. The Nicaragua Canal from the ocean to the river, from the Atlantic to the San Juan, is practically as long as the entire Panama Canal from ocean to ocean. The difficulties of construction at Panama have been revealed by the work already done.

The Nicaragua route, however, has one advantage which has been very attractive to many people in this country. The west end of the Nicaragua Canal is 500 miles nearer San Francisco than Panama. The trouble lies in the fact that a peninsula extends south about 200 miles on the isthmus west of Panama: Panama is in about latitude nine degrees, and a ship going through the canal and up the west coast must make about latitude seven degrees. This means that when you are through the Nicaragua route you are much nearer to San Francisco and all our northern Pacific ports. This, I think, is the one advantage which Nicaragua has over Panama as a location for a deep draught canal. But against this there are several things which will weigh pretty heavily. The east end of the Panama Canal is nearer to New York than the east end of the Nicaragua Canal.

The time required to pass the Panama Canal is about 12 hours. The time required to pass through the Nicaragua Canal is estimated at 33 hours. This means that a ship entering the Panama Canal in the morning can pass the last lock before dark, and pass out to the Pacific or Atlantic Ocean as the case may be. It means that if a ship is to go through the Nicaragua Canal, entering in the morning, she must spend the night in the canal, and if she does not wish to run at night she must spend two nights there. If she goes through without stopping, even

with a slow ship, one-half the saving in time on the Pacific is lost. If she lies up at night, all that advantage is lost. Beyond that, there is the increased risk of delays. Throwing out the whole of Lake Bohio, the actual length of canal navigation, not including the broadening harbors at Panama, is but little more than 30 miles; at Nicaragua it is in the neighborhood of 70. The risks of delay are hard to estimate; but if a ship grounds in a narrow channel or anything of that kind, all navigation is stopped until that ship is set free. That would increase much more rapidly than the length in which obstructions would occur, because not only would there be obstructions, but each delay would affect more ships. Probably the danger of delays would be four times as much at Nicaragua as at Panama.

There is also a difference in the cost of maintenance, which, as far as we have been able to determine, is somewhat more than a million and a quarter dollars a year.

There is another advantage in favor of Panama, which I attach more value to, perhaps, than other people do. It would be a short strait from ocean to ocean, without any unnecessary complications with countries which it runs through. There would practically be no country; one end is almost within sight of the other; whereas, a line nearly 200 miles through the center of a country, which would be more or less inhabited for the whole distance, might involve local international complications which it would be well to avoid.

There is also the question of protection. The canal would have to be protected, not defended against first class powers or fortified against strong nations, but it must be defended against the weak people who are around it. The trouble will be more in the nature of police than fortifications. At Panama a force can be brought from any point on the line of the canal to any other in less than two hours; probably if the railroad is maintained in high condition in one hour. At Nicaragua unless a railroad is built for the whole distance around the lake, which has not been contemplated, it will take at least 12 hours; it will require a very much larger force, involving very much greater difficulties in policing.

These are some of the reasons why the Panama Canal is to be preferred. They are not all. The question of cost is a very important one. . . .

The Nicaragua Canal has been estimated on precisely the same basis, the same prices for everything, the same percentage for contingencies, the same allowance, it being determined to put the canals as nearly on equal bases as possible. And yet, in a country uninhabited, as the country between Greytown and the San Juan River is, where all laboring population must be brought in, where every bit of country must be cleared, where no roads are possible because it is such a swamp, the risk of actual cost overrunning the estimates is considerably more than in the open country at Panama.

The work done at Panama by the old French company was of a reckless magnificence which has probably never been equaled anywhere. The company actually raised something like $240,000,000 in cash. Perhaps two-thirds of this went to the Isthmus. Perhaps one-half of that two-thirds was actually expended in excavation and work. A great deal of it went into machinery; some of that machinery is in good order, some of it is not. But those of you who have had to do with machinery know how much a machine is worth which is 20 years old. That is specially true of excavating machinery and everything of that kind. You had better throw it away. You could not afford to take it as a gift if you had to use it.

The value, however, which the French management attached to what they had done and to their machinery, their manner of estimating it and their method of avoiding negotiations, were such that the Commission felt that the only thing it could do was to tell them to go home. It was a case where it was not merely a question of what we could afford to give for the work, but whether the United States Government could afford to be imposed upon by foreigners? The Commission decided that it could not. Now, this has been entirely changed. Not only has the management of the French company been entirely changed, but it has submitted an offer to accept for the entire plant the amount which the Commission has estimated that it is worth; and that amount, if paid for the Panama Canal, will be an absolute fixed payment with no chance for uncertainty or contingencies, with no possibility of a wrong percentage for uncertain errors. And it has accompanied that offer with legal documents showing that it can pass an absolute, clean title to our Government.

That, however, would not enable our Government to build the canal. We could not work under any such concession as the French worked under. It would simply clear the ground so that we could make such treaty as we saw fit.

I do not know that I need say anything more on the merits of the two lines. The only advantage that I can see in Nicaragua, and I think that any engineer who has carefully investigated it will see, is the fact that the west end is nearer to San Francisco than the west end of the Panama Canal, and this is largely neutralized by the additional time required to pass through the canal, and entirely neutralized if you consider the additional risk.

There are some things about distances which I would like to call your attention to. They are easy to remember, and they are very suggestive. We all measure our longitude from Greenwich; Greenwich is practically London. The Mississippi River, as marked by St. Louis, Memphis and New Orleans, all of which are on the same meridian, is in longitude 90 degrees West. The mouth of the Ganges is in longitude 90 degrees East. The mouth of the Mississippi is directly opposite the mouth of the Ganges. The mouth of the Mississippi is almost north of where the Isthmian Canal would be. The mouth of the Ganges is a long way east of the Suez Canal. This means that very little business can be expected to go from any European ports through the canal across the American Isthmus. This canal must stand on its own merits. It must be a canal for American traffic. Furthermore, our Atlantic ports can reach Chinese ports by a little shorter route through the Suez Canal than across the American Isthmus. Manila is about equally distant by both routes. Japan would be nearer by the American Isthmus.

Another thing: a great circle curve drawn from the terminus of either canal to San Francisco would be almost entirely on land, it would pass through New Mexico; the shortest route by which any vessel could go from the terminus of either canal to Japan would take them so near to San Francisco that San Francisco would naturally be a coaling port. The distance from Panama to Yokohama, by way of San Francisco, is less than by way of Honolulu. San Francisco, furthermore, is the one port on the west coast of America which is nearest, not only to China and north Asiatic ports, but to Australia and New Zealand. There are some curiosities of this kind which it is important to think about.

From New York to San Francisco is 5,144 miles by way of the Panama Canal. A 15-knot ship going 360 miles a day would make that trip in about 15 days, including the canal, if everything was all right. From Plymouth, which may be taken as a sample European port, the distance is 7,674 miles; that would take 21 days; including the canal, probably with coaling, etc., 23. The opening of the canal would place our Pacific coast in direct communication with our Eastern coast and with Europe. It would place our Eastern coast and the Mississippi Valley in direct communication with the West coast of South America, the trade of which is now held in European hands. This is a thing to which little attention has been given, but it is likely to prove a very important one. But after all, I know of nothing which you can rely on less than statistics of transportation on a transportation route which does not exist. The profits and the business of the canal must be the results of conditions which that canal will create. The French company made very nice calculations based on the position of ships all over the world for several years. But the real fact is that the opening of this canal will encourage certain interests on our West coast and elsewhere, which cannot fail, in my judgment, to change many lines of trade, and to create traffic which does not now exist. If it were only to be the traffic which does exist, I should . . . doubt the expediency of building the canal.

There are two other things which should be referred to. We have a much larger merchant marine than is commonly supposed. Our navigation laws prevent our knowing what it is. No ship can sail under the American flag unless it is built in America; and the result is that other nations are getting the credit of shipping which we own. The International Navigation Company, for instance, owns four ships which sail under the American flag between New York and Southampton. They own two or three auxiliary corporations, formed under English and Belgian laws, which own several times as many ships which are sailed under foreign flags. The heaviest freight carrying line now sailing out of New York is owned in this country, the Atlantic Transport Line, and yet it has not a single American ship. Possibly our navigation laws will compel a continuance of this abnormal condition. But whether they do or not, we are no longer out of the carrying trade. We are performing it secretly under other flags, and our ships will get quite as much benefit out of it as anybody, and we soon shall have as many as any nation.

Our coasting ships under our present laws can attend to our East coast and to our West coast. They cannot communicate between the two. With a canal, they can. We could not take fleets through a canal in all probability in times of war. But the value of a fleet is not so much to fight in war, as to prevent the occasion of war; and the exercise and duties which an American fleet could perform with the existence of a canal, the change of stations and the discipline of squadrons, would be very greatly improved. Our fleets would be much more effective, not perhaps in fighting, but in preventing the necessity of fighting.

Pensions and Relief in France.

The French Academy of Moral and Political Sciences has awarded a prize to the French railroad managements for measures they have taken in the way of sick funds, pensions, etc., for the benefit of their employees, the railroads being the first of all French industries to do anything of the kind, the Western Railroad Co. leading as early as 1850. The *Railroad Gazette* some 25 years ago gave an account of these measures as they then were in articles afterwards published in a pamphlet entitled "French Railroad Employees." At the present time about four-fifths of the French railroad employees are contributors to pension funds, and under certain circumstances are entitled to pensions; and some 50,000, including retired employees, widows and orphans, are now drawing pensions, to the aggregate amount of about $8,000,000 a year. The companies' expenditures for pensions and other institutions for the benefit of employees is now about $13,000,000 per year, which is about 40 per cent. of the amount paid to the stock and bondholders. The amount paid for wages is about $72,000,000 yearly. The pensions, etc., of course, virtually make a part of the wages, and a very material part; and so far are the companies from obtaining esteem for the course they have taken that the Parliament threatens to compel them to do more. A bill prescribing shorter hours and larger pensions is pending, and the Minister of Public Works has promised to urge its passage; though, as the State guarantees interest and dividends on the companies' securities, an increase in their expenses in many cases will increase by so much the advances to them by the government. In this case the Minister of Finance, colleague of the very Minister who urges the passage of the bill, says that if passed it would add $14,000,000 a year to the government's expenses, which cannot possibly be permitted. It is quite possible that some who publicly favor the bill would at least urge it if they did not feel certain that it could not pass the Senate. Such things have been known in legislative bodies less distant than France.

The National Bureau of Standards.

By an act of Congress, approved March 3, 1901, the office of Standard Weights and Measures of the Treasury Department was, on July 1, 1901, superseded by the National Bureau of Standards, the functions of which are as follows: The custody of the standards; the comparison of the standards used in scientific investigations, engineering, manufacturing, commerce, and educational institutions with the standards adopted or recognized by the Government; the construction, when necessary, of standards, their multiples and subdivisions; the testing and calibration of standard measuring apparatus; the solution of problems which arise in connection with standards; the determination of physical constants and the properties of materials, when such data are of great importance to scientific or manufacturing interests and are not to be obtained of sufficient accuracy elsewhere.

The Bureau is authorized to exercise its functions for the Government of the United States, for any State or municipal government within the United States, or for any scientific society, educational institution, firm, corporation, or individual within the United States engaged in manufacturing or other pursuit requiring the use of standards or standard measuring instruments. For all comparisons, calibrations, tests, or investigations, except those performed for the Government of the United States or State Governments, a reasonable fee will be charged.

Plans are being prepared for a physical laboratory which will be equipped with apparatus and conveniences for carrying on investigations, and for testing standards and measuring instruments of all kinds; also a somewhat smaller building, to be known as a mechanical laboratory, which will contain the power and general electrical machinery, the instrument shop, refrigerating plant, storage batteries, dynamos for experimental purposes, and laboratories for electrical measurements requiring heavy currents.

For the present the work of the Bureau will be limited to the comparison of the following standards and measuring instruments, either for commercial or scientific purposes:

Length Measures.—Standard bars from 1 to 10 ft., or from 1 decimeter to 5 meters; base bars; bench standards; leveling rods; graduated scales; engineers' and surveyors' metal tapes 1 to 300 ft., or from 1 to 100 meters.

Weights.—From 0.01 grain to 50 lbs., or from 0.1 milligram to 20 kilograms.

Capacity Measures.—From 1 fluid ounce to 5 gals., or from 1 milliliter to 10 liters.

Thermometers.—Between 32 deg. and 120 deg. Fahrenheit, or 0 deg. to 50 deg. centigrade.

Polariscopic Apparatus.—Scales of polariscopes, quartz control plates and other accessory apparatus.

Hydrometers.—Alcoholometers, salinometers, and saccharometers, whose scales correspond to densities between 0.85 and 1.20.

Resistances.—Standard coils of the following denominations: 1, 2, 5, 10, 100, 1,000, 10,000, 100,000 ohms: low-resistance standards for current measurements of the following denominations: 0.1, 0.01, 0.001, 0.0001 ohms. Coils of resistance boxes; potentiometers; ratio coils.

Standards of Electro-Motive Force.—Clark and other standard cells.

Direct-Current Measuring Apparatus.—Millivoltmeters and voltmeters up to 150 volts; ammeters up to 50 amperes.

It is the desire of the Bureau to co-operate with manufacturers, scientists and others, in bringing about more satisfactory conditions relative to weights and measures in the broader meaning of the term, and to place at the disposal of those interested such information relative to these subjects as may be in possesssion of the Bureau. All communications and articles should be addressed to the "National Bureau of Standards, Washington, D. C."

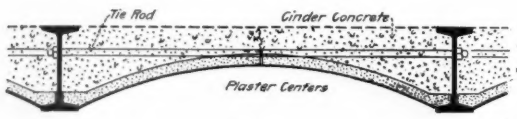
A Test of Vulcanite Fire-Proof Flooring.

We give herewith some extracts from a report made to the Vulcanite Paving Company by Mr. Howard S. Richards, of Wilson Brothers & Company, of Philadelphia. The subject of this report was a fire and water test of Vulcanite floor (Bromley patent), at the Thirtieth street yards of the Vulcanite Paving Co., in Philadelphia, on Jan. 15, 1902. Chief officers of the Philadelphia Bureau of Building Inspection, the Bureau of Fire, the Fire Underwriters' Association, of Wilson Brothers & Co., and of the Vulcanite Paving Co. were among those who saw the test. The illustrations that are here given show several ways of making this floor and ceiling and the following extracts show some highly satisfactory results as reported:

The furnace used was 11 ft. wide, 14 ft. 4 in. long and 8 ft. 11½ in. from the top of the grate bars to the under side of the floor beams.

The section of floor tested formed the roof of the furnace, and was what is known as Type F, Vulcanite floor. It was constructed between 10-in. I-beams spaced 5 ft. from center to center, and consisted of concrete arches laid on plaster centers, with wire, lath and cement plaster fire-proofing for the lower flanges of the beams, and a wire, lath and plaster flat ceiling suspended from the lower flanges of the beams. The floor system was finished on top with the usual 3-in. x 4-in. wood sleepers, spaced 16 in. center to center, running at right angles to the beams and filled in between with concrete.

The plaster centers upon which the concrete arches were laid consisted of a plaster of Paris composition 1½ in. thick, and had a rise of 5½ in. This gave the concrete floor arches a rise of 7 in. The concrete arches were 3 in. thick at the crown and had bearings on the



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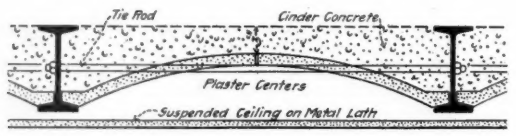

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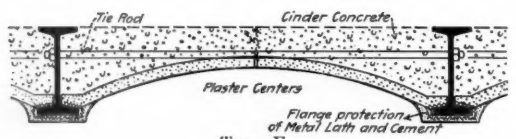

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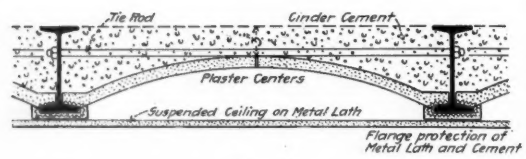


Type F.

The Vulcanite Fire-Proof Floor System.

lower flanges of the I-beams equivalent to about 50 per cent. of the length of the beams. This concrete was composed of one part Vulcanite Portland cement, two parts sharp Jersey gravel and five parts ordinary boiler cinders, twice mixed dry, and the wet cinders and additional water added in the final mixing.

The concrete filling between the sleepers over the beams was composed of one part Vulcanite Portland cement, two parts Jersey gravel and eight parts ordinary boiler cinders, properly mixed. The protection for the lower flanges of the beams was composed of ordinary No. 20 wire lathing cloth, turned over the lower flanges and plastered with a mortar about 1½ in. thick, composed of one part Vulcanite Portland cement and two parts fine Jersey gravel.

The flat suspended ceiling was composed of 9 x 12-in. mesh Nos. 11 and 12 gages, electric welded wire cloth, wired fast to ¾ in. channels running at right angles to the beams, and spaced about 19 in. apart. No. 20 wire lathing cloth was wired fast to the under side of the electric welded cloth and the whole plastered with two coats of "Victor" plaster about ¾ in. thick. The ceiling channels were secured to the lower flanges of the I-beams in the usual manner by strap iron clamps.

Unusual precaution was taken to secure an immediate high temperature, and to maintain this temperature practically uniform throughout the test. This was accomplished by connecting the draft space under the grate bars, by a 16-in. pipe, to a steam-driven pressure-fan which would deliver the proper amount of air necessary for the fiercest combustion. Fire was started in the test furnace at 10:42 a.m., Jan. 15, 1902, and was kept going continuously until 2:03 p.m., when the water was turned on. The inside temperature, as taken by the Brown water-current pyrometer, handled by a pyrometer expert, recorded about 1,500 deg. Fahr. at 11:35 a.m., and increased to 2,000 deg. Fahr. at 12 o'clock, and from that time on ranged from 2,000 to 2,135 deg. until the water was turned on at 2:03 p.m.

In about one-half an hour after the fire was started the metal ceiling had badly warped and the plaster had badly cracked. At about 12:15 the flames and gases had worked their way through the ceiling and at 12:45 it was practically destroyed; the plaster centers, however, lasted until about 1:30. The flames, after working through the ceiling and plaster centers, beat directly against the concrete arches and beam protections, and at the termination of the fire test at 2:03, these arches and beam protections were still in a sound and perfect condition, not even a crack being observable in either.

As the concrete arches are assumed to form the entire structural part of the floor and also, in the main, the fire-proof part of the floor, their behavior under every condition of test was satisfactory to the largest degree. At 12 o'clock a glass "marble" was instantly melted upon introduction on an iron bar through one of the holes, and also in two instances thereafter pieces of copper were almost immediately melted upon being exposed to the heat. The furnace walls and chimneys became badly cracked and eaten out, and in fact the only things that did not seem to be injured or disturbed were the steel beams, the concrete arches and beam protections.

At 2:03 p.m. the furnace door was opened and a stream of water from a 1⅛-in. fire nozzle at 65 lbs. pressure per sq. in., was played upon the ceiling and side walls (principally upon the ceiling) for 10 minutes, the water being turned off at 2:13. The only effect of the pounding action of this stream was to wash off some of the mortar composing the flange protection of the beams, and to pit the under side of the concrete arches to a very slight extent. None of the wire lath was burned or washed from the lower flanges, a good part of the cement plaster protection still remained, and there were no cracks, holes or defects of any kind in the concrete arches.

The day previous to the test all three arches were loaded with slag bricks to 200 lbs. per sq. ft. of area of floor, and this load remained on during the fire and water test, immediately after which the center arch (which had been exposed to the fiercest flame) was loaded to 600 lbs. per sq. ft. None of this loading had any injurious effect upon the floor system, and the final loading was only discontinued when the furnace walls showed signs of collapse.

The Railroad Commissioners On the Tunnel Collision.

The preliminary report of the New York State Railroad Commissioners on the collision in New York City, Jan. 8, embracing recommendations for safety, was given in the *Railroad Gazette* of Jan. 31, together with a copy of a bill which the Commissioners have sent to the Legislature. The Commissioners took further testimony in New York on Thursday and Friday of last week. Mr. Neff, lately general superintendent of the Boston Elevated, was questioned concerning the running of trains through the subway in Boston and concerning the use of electric motors. Mr. Neff thought the third-rail method of traction could be used at the New York terminal. It would require at least a year to build the necessary power house and engines for such a large installation. The number of trains running through the Boston subway daily is 700, and the number of passengers carried daily on the elevated road of that city is from 230,000 to 250,000. Mr. Neff recommended the use of an automatic stop such as is used in Boston. Motormen had disregarded stop signals on the Boston line; for the first offense they were suspended and for the second, discharged.

Mr. W. D. Young, of the Baltimore & Ohio, told of his experience in the operation of the tunnel of that road in Baltimore. He would not advise the use of the third-rail system in a large and crowded yard. The Baltimore tunnel is lighted by 16 c.p. incandescent lights on one side, set 15 ft. apart. At distances of about 1,500 ft. are additional lights under the others, numbering 1, 2, 3, 4, and 5, indicating the sections of the tunnel and enabling an engineer to ascertain his location. About 115 trains pass through the tunnel daily, and no two trains are allowed on the same track within the tunnel at the same time. The trains are moved by electric locomotives.

Mr. John T. Cade was questioned about the signals in the tunnel and the best signaling practice for such a situation. He did not like the audible signals, but would maintain the torpedo, in deference to the wishes of the public. The torpedo probably would not fail more than one time in ten thousand. The present signals were perfectly safe if enginemen did not violate the rules. If an engineman cannot see a signal it is his duty to stop and wait, ten years, if necessary. The short block section, 788 ft. long, at the south end of the tunnel, is necessary to expedite the movement of trains to and from the yard.

Capt. William M. Folger, United States Lighthouse Inspector at New York, was questioned about the efficiency of the lamps in the tunnel. It would appear, from the report of the testimony, that two sizes of lamps are used in the tunnel, the larger size being too large for the space available at some of the signals. The larger light would be visible in clear weather six or seven miles. Questioned about the quality of the glass, Capt. Folger said that lenses made of pressed glass were not so accurate and therefore would not throw light so far as lenses accurately ground. With a powerful light and accurate lenses rays are projected from the Navesink lighthouse 40 or 50 miles. Capt. Folger thought the green glass used in the tunnel signals was too dark, and in the lamps fitted with flat wicks he recommended a circular wick, to give a more powerful light. One of the lamps used in the tunnel gave, according to Capt. Folger, about 17 candle power. He said that a 32 candle power electric light could be put in the same space, but he thought that, of two lamps of the same candle power, the rays from an oil lamp would penetrate smoke and fog better than the electric light.

Mr. Kinch, Signal Engineer of the New York Central, was questioned about the interlocking in the yard, where low-pressure pneumatic apparatus is used. The movements in the yard are 100,000 a month, and the number of failures recorded in eleven months has been 82, mostly due to switch points being clogged by ice.

Engineer Dougherty, of the New Haven train which was wrecked on Jan. 8, testified. He said that although signals in the tunnel were more or less obscured at times, there never was a time when he couldn't pick out every signal. All it required was a little care. On Jan. 27 the tunnel was in much worse shape than it was on Jan. 8, and yet he found his stop signal at Seventy-second street, and stopped his train within 10 feet of it. Running at 25 miles an hour was safer than running at 18, because at the latter speed it was often impossible for a man to get out of his steam.

Mr. Henry T. Whipple, Road Foreman of Engines, said that he had ridden with Engineman Wisker the night before the collision and found him competent. Wisker had run through the tunnel 10 times (five times each way) on the two days preceding the collision.

General Superintendent Platt, of the New Haven road, appeared and asked for a suspension of the order of the Commissioners forbidding the use in the tunnel of cars containing oil lamps; it would take his road 90 days to equip its cars so as to comply with the order. The Board granted a stay of 30 days.

The question of responsibility for the deaths of the passengers who were killed in the collision will be investigated by the New York grand jury.

Shop Improvements at Jackson, Mich.

Mr. C. H. Wilmerding, Consulting Engineer, Chicago, is now engaged in making plans for the electrical work to be installed in connection with the Michigan Central shop improvements now under way at Jackson, Mich. The machine erecting shop will be increased by an addition, 360 ft. long x 140 ft. wide, with longitudinal erecting tracks. The new pit tracks are 720 ft. long in all. This new shop, which is at right angles and joins the present erecting shop, is served by overhead traveling cranes capable of lifting the largest engines. Overhead cranes will also be put in the present erecting machine shop and boiler shop, the former having ten and the latter five transverse pits. Four small isolated boiler plants in different buildings will be eliminated by a new central lighting and powerhouse, 85 x 90 ft., and all the shop tools, cranes, transfer table and turn-table will then be driven by electric motors.

This installation is notable in that a three-phase alternating system will be used throughout, the pressure being 440 volts on all but the lighting circuits. On these the voltage will be reduced by static transformers suitably located. So far as we know this is the first railroad shop where alternating current has been used exclusively. It is intended to light the station, freight house and yards at Jackson with current from the power house, making it necessary to transmit current about two miles. For this transmission alternating current was most desirable and to keep all the apparatus uniform it was decided to use the alternating system throughout. All the electrical apparatus will be furnished by the General Electric Co., G. E. type M motors being used for the cranes, transfer table and turn-table. This type of motor is especially designed for frequent starting of heavy loads.

The power house will be equipped with three Babcock & Wilcox boilers of 260 h.p. each; one 75-k.w. and two 200-k.w. generators direct-connected to tandem compound Ball engines. Green economizers, Sturtevant induced draft and Green chain grates will be used. Room is provided for another boiler unit and another 200-k.w. generator and engine. The exhaust steam pipes between the engine and boiler rooms will be carried in a conduit under the floor. The main buildings will be heated by a hot blast system and probably a system of steam heating by radiation will be used for the smaller buildings. Work on these improvements is now under way.

Efficiency of Parsons Turbines.

It is reported from London that the "King Edward," a passenger steamer 250 ft. long and 30 ft. wide, having Parsons turbines, three shafts and five screws, was so satisfactory last year on the Clyde estuary that a larger boat will be built, similarly equipped. Tested against a boat of the same class, but having ordinary engines, the following results were obtained:

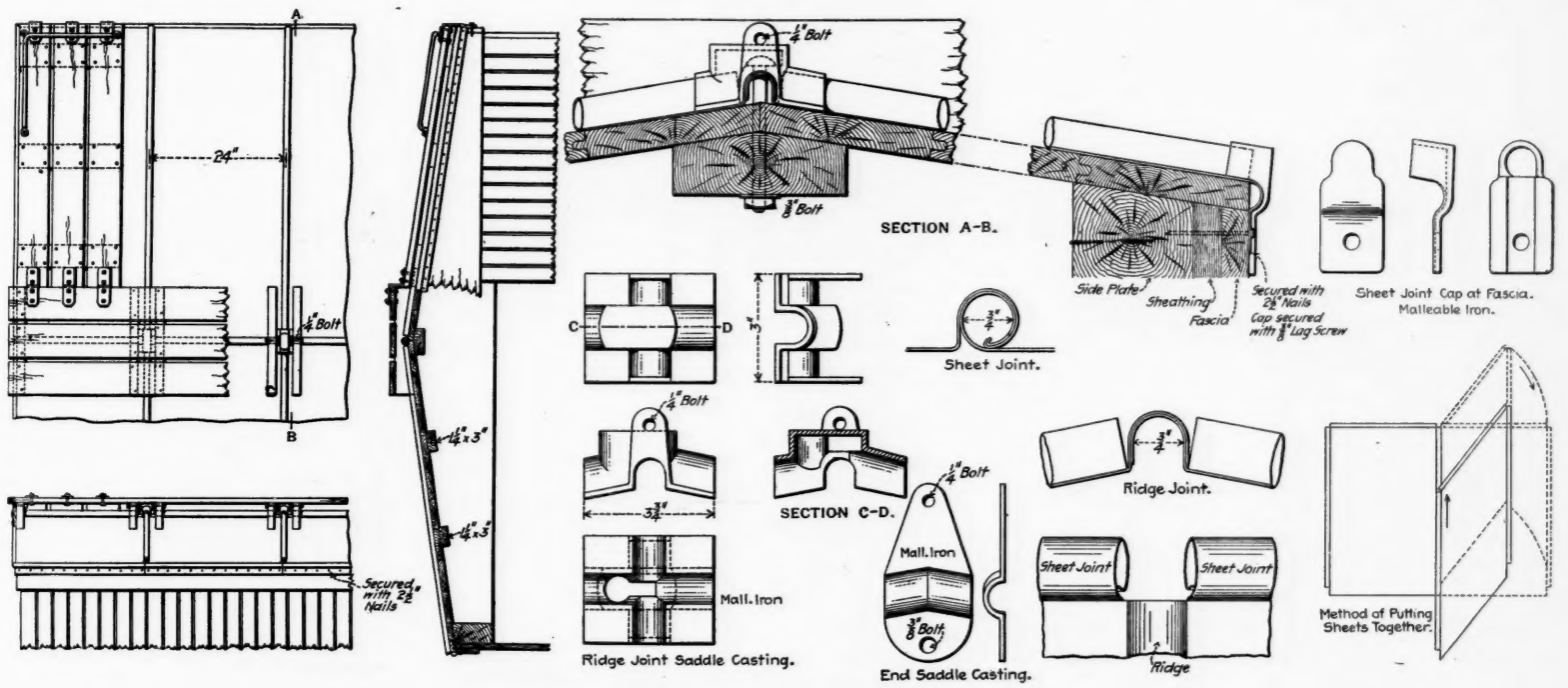
The "King Edward" burned 1,429 tons, 16 cwt. of coal, as against 1,758 tons, 13 cwt. consumed by the "Duchess of Hamilton." The total mileage of the "King Edward" was 12,116, of the Duchess of Hamilton 15,-

604. Miles per ton of coal for the "King Edward" thus works out at 8.47, compared with 8.87 for the "Duchess of Hamilton," while the average speed of the "King Edward" was 18½ knots to 16½ knots for the "Duchess of Hamilton."

The Parsons Company has now in hand the machinery for a new torpedo boat destroyer of somewhat the same type as the "Viper," which was lost through running on the rocks off the Channel Islands during last year's naval maneuvers. Certain improvements are being introduced, the chief of which are designed to secure fuel economy. The vessel is expected to consume less coal, both at highest speed running and under cruising conditions, although she will have the same speed as the "Viper," about 34½ knots. The Parsons Company is also at present engaged on the machinery for three large yachts. One of these is being built to the order of Col. McCalmont, M. P. She will be fitted with Yarrow water-tube boilers and have a speed of 24 knots. Her length will be 152 ft. 6 in. and her width 15 ft. Another turbine-propelled yacht is under construction for Sir Christopher Furness. She will be of 700 tons' measurement and 1,500 h.p. The third vessel is a large yacht for A. L. Barger, of New York, her measurement being about 1,400 tons, length 260 ft. 8 in., breadth 33 ft. 3 in. The hull and boilers are being constructed by Ramage & Ferguson, of Leith.

The Hutchins Outside Iron Freight Car Roof.

The illustrations show the Hutchins outside galvanized iron freight car roof, which is the latest style of outside metal roof made by C. B. Hutchins & Sons, Detroit, Mich.



The Hutchins Outside Galvanized Iron Freight Car Roof.

This roof differs very materially from others in that it requires no sheet iron caps or wooden battens extending from the ridge to the fascia to protect or secure the joints, nor is any riveting required. Each sheet connection is a perfect joint in itself. The joints are formed by rolls or circular hooks, which are securely interlocked, and while perfectly flexible, are absolutely water-tight. Malleable iron caps are provided to protect the corners of the plates at the ridge at each intersection, and also to firmly secure the sheet to the car. The cap consists essentially of a four-way hood, having intersecting radially-extending channels into which is placed the ridge bolt, which is entirely covered and protected. From 2½ to 3 in. more head room in furniture or box cars can be had by using this type of roof.

The Pennsylvania and Montauk Point.

When the Pennsylvania Railroad bought the Long Island we took pains to once again explain that the enterprise had nothing whatever to do with Austin Corbin's fantastic scheme for a great port at Montauk Point. But folks forget amazingly and this notion has the life of a cat. Therefore, we are glad to have the chance to reprint the following letter from Mr. Cassatt to the *New York Sun:*

"Reference is made in your issue of yesterday to two matters which have been frequently referred to by the newspapers for a year or more past and about which an entire misapprehension exists.

"One is that the Pennsylvania Railroad Company, in purchasing the stock of the Long Island Railroad Company, had in view the establishing of a steamship line to run from Montauk Point to Milford Haven. No such project was ever considered for a moment by the management of the Pennsylvania Railroad Company. The distance between Montauk Point and Milford Haven, via the short or winter route, is 2,849 knots; the distance from the Battery, New York, to Milford Haven is 2,948 knots; the difference in favor of Montauk Point is 99 knots, or five hours' sailing for one of the fast steamers. If you deduct from this the two and one-half hours that would be required to run a special steamer train from New York to Montauk Point, and another half-hour for the transfer of passengers and baggage to the steamer, it will leave a saving of only two hours in favor of the Montauk Point route. Certainly, in order to save this trifling amount of time, passengers would not put themselves to the inconvenience of the trip by rail and the transfer when they can walk comfortably on board ship in New York.

"Another misapprehension in the public mind, which is referred to in your article, is that the Pennsylvania Railroad Company has control of or owns a large interest in the International Navigation Company. The Pennsylvania Railroad Company is not a stockholder of that company and has no interest in it whatever excepting that it owns $340,000 of its bonds, acquired many years ago through the sale of the four original American Line steamers running between Philadelphia and Liverpool."

The Architecture of Bridge Design.

Mr. Lindenthal, Bridge Commissioner of New York, has very definite notions about the aesthetics of bridges, and has frequently expressed himself as disposed to do what he can to improve the appearance of the bridges under his charge. That being so the following interview with him, printed recently in a New York daily newspaper, is of especial interest:

"A new bridge is being built, and as its plans were completed before my term of office, I cannot change them. It is known as the New East River Bridge, and leads from Delancey street to Williamsburg. I propose to have the anchorages treated more artistically above the cornice line, to which they were completed, so as to give a more appropriate and pleasing entrance to the structure, looking from the approaches. I shall also consult an architect as to the form of the housings on the top of the steel tower.

"The bridge approach on the New York side is of steel, leaving an open space underneath. This space I propose to utilize for market purposes, as the bridge approach is in a poor quarter of the city, where a great deal of daily marketing is done in the open air on the streets, congesting them and littering them with rubbish. If I succeed in carrying out my idea these markets would be under the bridge, and proper regulations could be enforced as to cleanliness. Of course, no combustibles or other like dangerous articles would be allowed to be stored under the bridge approaches.

"There are two other bridges building over the East River. One is near the navy yard, and for that bridge the contract has been let only for one tower foundation. The right of way is being bought on the Brooklyn side. The plans for this bridge are now under revision, with a view of improving the architectural appearance of the bridge, which will also be a suspension bridge. When completed this will make three large suspension bridges within one mile over the East River.

"The fourth bridge will cross the East River between Fifty-ninth and Sixtieth streets, and will be a cantilever structure, with piers on Blackwell's Island. The plans for this bridge are likewise under revision, with a view of making it beautiful. Another bridge under construction is at 145th street, over the Harlem River. It will be a drawbridge and similar in appearance to the bridge at 155th street, over the Harlem River. The plans have been prepared by Professor W. H. Burr, of Columbia University."

In regard to the naming of the new bridges three names for each bridge were submitted to the Bridge Commissioner by a committee of the American Scenic and Historic Preservation Society, consisting of Col. Henry W. Sackett, Edward Hagaman Hall and F. W. Halsey. From this list Commissioner Lindenthal chose the names "Navy Yard," "Williamsburg" and "Ravenswood."

New Ordnance Storehouse at the Brooklyn Navy Yard.

The new ordnance storehouse which will be built on the Cob Dock in the Brooklyn Navy Yard, this spring, will be a rectangular building 300 ft. 8 in. long x 60 ft. 8 in. wide, with a gable roof. The building will be entirely of steel and brick, with concrete foundations and floors and a slate roof. It is to be equipped as the most serviceable ordnance building which the Government has ever built. There will be runways for three traveling cranes in the first story, and skids for 8-in. and 4-in. guns. About 1,800 piles will have to be driven to carry the concrete foundations, footings, and piers. The steel framework will consist of Z-bar columns, plate girders, floor beams, and roof trusses spaced 20 ft. on centers. The walls will be of red brick and trimmed with granite to conform with the architecture of other new buildings in the Navy Yard. The first floor is to be of cinder concrete, consisting of a 15-in. layer of cinders, upon which will be placed an 8-in. concrete floor, the wearing surface of which will be a 1-in. layer of granolithic flooring. The second floor will be of steel and concrete, and its wearing surface will consist of 1½-in. tongued and grooved yellow pine flooring laid on 2 x 3 in. yellow pine sleepers, placed 2 ft. on centers, and imbedded in concrete. The ceiling over the rooms in the second story will consist of 7-in. steel channels, spaced about 6 ft. center to center, attached to the bottom chords of the trusses, to which will be attached ceiling angles, spaced 20 in., center to center, and metal lath, which will receive two coats of plaster. The roof will be built of 3½ in. of cinder and Portland cement concrete, laid so as to imbed expanded metal laid upon and fastened to the purlins. This concrete surface will be covered with slate and the roof is to be fitted with two paradigm skylights, each about 260 ft. long and 11 ft. wide. The gun skids on the first floor are to be of concrete fitted with rails.

The bids for the construction of the building were opened on Nov. 30 last, and were surprisingly close, there being hardly $3,000 difference in the bids of the six lowest bidders. The New York Bridge & Iron Co. were the lowest bidders and the contract was awarded to them. They expect to begin operations early in the spring and are now closing sub-contracts and placing orders for material.

The building is No. 130 and is the first of a number that are proposed on the Cob Dock, and for which bids will probably be wanted in the near future.

Foreign Railroad Notes.

The Western Railroad of France proposes to adopt a system of reserving seats in passenger trains by the issue of duplicate numbered tickets.

The Austrian State Railroads have let contracts for 968 tons of cast-iron rail chairs, which have been introduced quite recently. Nearly all will be furnished by one company, which offered them for $1.33 per 100 lbs.

The Prussian Minister of Public Works has forbidden collections among employees for purchasing presents for their superior officers.

The Austrian Railroad Minister has issued a circular to the railroad companies, congratulating them on the progress they have made in adopting the block system, which has but recently been introduced in Austria. He closes by notifying them that by Oct. 1, 1903, it must be in force on all but some local lines.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

A Washington despatch of the 4th says that Mr. Menocal had appeared before the Senate Committee on Interoceanic Canals to testify as to the engineering features of the two routes. We are told that "he said that there was every probability from an engineer's standpoint that the canal could be built by the Nicaragua route, and every probability that it could not be built by the Panama route." We cannot believe that this is a correct report of what Mr. Menocal said. But if he did make an argument on such lines it could not have much weight with the Senate Committee or with intelligent people anywhere. Such an argument could not stand many minutes in the face of a treatment of the subject so broad, original and fair as Mr. Morison's, which appears on another page of this issue of the *Railroad Gazette.*

In reading the wonderful report of the United States Steel Corporation one is sure to be struck by the statement of the policy of the directors in the matter of prices. That has been a policy of moderation and stability. The principle has been to keep the prices steady and not permit them to be run up under the demand of the year, and thus to encourage enterprise and the expansion of consumption and so to enlarge the market. This is the greatest single example ever seen of the application in practice of modern notions of political economy, and few who have thought much about the general subject will doubt the fundamental soundness of the principle. The report tells us that large economies have been made in manufacturing by frequent interchange of views and of full information among the constituent companies. How great these economies are we have no means of judging, but we do know that it is the practice to assemble committees representing the different branches of manufacture by which committees technical matters are discussed. When we consider the vast territory covered, the wide diversity of conditions, and the amount of experience and ability assembled, it is fair to assume that this system of conference and mutual instruction will produce important results.

On another page are printed parts of two recent letters from Mr. F. J. Sprague, carrying on the discussion awakened by the recent letters of Mr. Westinghouse in the matter of some of the dangers in electric traction. While Mr. Sprague has intended to controvert Mr. Westinghouse, he practically confirms the essential part of Mr. Westinghouse's position. Sources of fire danger are specifically pointed out, as are the means that should be taken to prevent them. This is all that Mr. Westinghouse has asked for and all that we asked for in considering this matter editorially a few weeks ago. No sensible man of our acquaintance has the least doubt of the further great use of electricity for traction. Mr. Westinghouse is one of its ablest and most enterprising promoters. Perhaps it is not saying too much to say that no other individual in the world is doing so much at this moment as he is to extend this use of electricity. But he does not want the matter delayed by accidents that should be foreseen and provided for. Among other things said by Mr. Westinghouse in his letter, occurred the statement that the current to run a heavy train is enough to melt a substantial iron bar. Mr. Sprague says that the same thing is true of a lighting current, and seems to say this as, in a certain way, a reply to Mr. Westinghouse. But surely he knows very well the anxiety that the lighting current has given and is giving to underwriters, and he knows what losses it has cost to the stockholders of fire insurance companies. In speaking of the very numerous trolley car accidents that have taken place he says that these have been brought about by ignorance and carelessness, the want of proper signals, or by men running past signals, etc., which is precisely what we have said with regard to heavy electric traction. That is, we must expect the element of human fallibility to continue to work just the same as it is working, and do our best to provide against its effects. The fact that the trolley car accidents have not been complicated by fires is quite aside from the question which Mr. Westinghouse raised. The line carrying the current is overhead, out of the way of the wreck, and connection is cut off by the very fact of the accident. But the aggregate loss of life in these trolley car accidents would be appalling if one were to take the time and trouble to collect the figures. All of this, however, does not mean that we or anybody else supposes that the spread of transportation by trolley lines is going to be delayed a moment. No one has taken such a foolish position.

Freight Car Bolsters.

Mr. R. P. Lamont in his paper before the Western Railway Club on the bolster problem (see our issue of Jan. 24) brings up an interesting subject which was pretty freely discussed about four years ago, when metal body and truck bolsters were just beginning to be used in a large way. Since then four or five companies have developed an important business in freight car bolsters of commercial shapes, pressed steel and cast steel. This is probably as good an indication as any of the general acceptance of the metal bolster. From which it follows that the principles upon which these bolsters are designed have also been generally accepted; namely, that the load should all be carried at the center plates, and that the bolsters should be sufficiently rigid to maintain a clearance between the side bearings. We should now begin to know whether the metal bolsters which have been put in service under flat-bottom cars maintain a clearance at the side bearings, and, if not, what is the trouble. Mr. Lamont's paper throws some light on these questions.

From an examination of a miscellaneous assortment of a thousand loaded cars, all built within the last three or four years and all less than 80,000 lbs. capacity, it was found that 60 per cent. had old style bolsters and the balance had some one of the several designs of steel bolsters now on the market. Of the old style bolsters, 91 per cent. was found riding hard on the side bearings, and of the new style bolsters 28 per cent. was down.

Most of the failures of the old style bolsters to maintain a clearance at the side bearings is said to be due to a lack of appreciation of the problem; in other words bad design. Of the failures of the new style bolsters the chief cause is the lack of room to get in a suitable bolster, and other limitations. They have sometimes failed because transverse strains were not provided for, and, in some cases we have known of, the high fibre stresses used made failure a certainty. These figures are probably representative, and at least it is quite possible that one-fourth of the new style bolsters are not rigid enough.

Mr. Lamont's remedy is summed up in the conclusion of his paper: Provide a reasonable space for the bolsters; provide a reasonable proportion between length and depth, and then pay for enough metal so that the stresses can be kept within safe limits. If the principle of carrying all the load at the center is going to be adhered to, which no one is sure of, these suggestions are good and to the point. But they are open to the criticism that, the conditions being known, these things have been disregarded during the last four or five years; and the reason, of course, is to keep the trucks interchangeable. Now, we fail to see what new influences will bring about these changes in car design.

How a vertical space of 10 or 11 inches can be readily provided for the body bolster of flat-bottom cars is well known, and, for instance, was pointed out in our issue of October 28, 1898. The position was then taken that on new cars it simply involved a low truck and truck bolster, similar to a design then used by the Northern Pacific, in combination with the floor level standard on some of the largest roads. The low truck could be made the only change required in most cases. As it is necessary to repair foreign cars and handle them in cases of wrecks, which trucks vary greatly in height, it is doubted if any road be much better off if all its freight trucks were interchangeable. In fact we doubt if there is an important road which is not already maintaining these low trucks under a portion of its equipment, such as furniture cars. Still there has been a decided aversion to changing the car construction in any particular to benefit the bolsters. A possible reason may be given. A weak bolster settles down on the side bearings, and then attracts little attention to itself, and makes it unlikely that it will take precedence over things which put the car out of service when a failure occurs. These things make it unlikely that Mr. Lamont's suggestions will be acted on.

Further, as we see it, Mr. Lamont's is not the *ultimate* solution of the bolster problem. A new factor is now coming to the front, and we refer to the draft gear problem. We will try to make ourselves clear.

In the first place, unlike the bolster, a weak draft gear means a failure which attracts attention, and so the draft gear stands a good chance of being improved. By a slow but sure process, railroads are realizing that the yielding resistance of the draft gear must be greatly increased, probably 100,000 to 150,000 pounds being none too much to suit the present conditions of large locomotives and cars. With such high capacity gears the usual forms of fastenings are entirely insufficient, and already this is having its effect on car design. With underhung draft gears of 20,000 to 40,000 pounds' capacity, the horn of the coupler strikes the end sill under comparatively light shocks, and so relieves the fastenings and transmits the heavy shocks on a line with the sills. Where high capacity draft gear is attached in the same way, underhung, the fastenings are obliged to transmit much heavier shocks before the blows are taken at the coupler horn, and it has been clearly shown in service that these blows below the axis of the sills are sufficient to break metal center sills over the bolster. The fallacy of attaching high capacity draft gear beneath the sills has already been demonstrated in service on a pretty big scale.

With high capacity draft gear, experience has shown that as one essential the line of draft must be on or very close to the neutral axis of the member to which the draft gear is fastened; and further, that this member should be a steel section extending unbroken from end to end of the car. In other words, the draft gear should be placed on the neutral axis and between metal center sills. Of course, this in itself does not mean an entire steel underframe, and yet that is doubtless the logical result.

Those who have given this subject the most study hold that a composite construction for the car underframe cannot be satisfactory. The shrinkage of the wooden members when used in connection with steel center sills is objectionable, as well as wood and metal connections. Further, this location of the draft gear means such a cutting away of the end sill about the coupler as to require that the end sills be of steel. In any event, it seems hardly worth while to use steel center and end sills, and then make the remainder of the underframe of wood. The steel underframe would therefore seem to be the final form of car construction which will be used; in turn forming an elegant solution of the bolster problem. As an important instance of this very thing, it may be noted that the Pennsylvania has definitely settled on just such a construction for all its new flat-bottom freight cars; steel underframes with friction draft gear between the center sills.

In view of these things it seems reasonable to think that the body bolster problem will *ultimately* be solved incidentally to providing suitable draft gear and underframes to suit modern conditions, and with steel underframes the body bolsters will be quite different from those which Mr. Lamont discusses. Of course, this all applies to new construction.

Annual Reports.

The United States Steel Corporation.—The preliminary report of the United States Steel Corporation to Dec. 31 was made public last week just after we had gone to press. This report covers the first nine months of the existence of the corporation; the plan is to make the fiscal year of the corporation the same as the calendar year. For the nine months the net earnings per month varied from $7,357,000 in April to $12,206,000 in October. It will be understood that the earnings during the close of lake navigation must be diminished as the operations of the mining and transportation companies are either closed or cut down. The statement for the nine months is as below:

Net earnings		$84,779,298
Sinking funds	$2,263,292	
Reserve funds	9,695,702	
		11,958,994
Balance		$72,820,304
Nine months' interest on bonds		11,400,000
		$61,420,304
Dividends (preferred at 7 per cent. annual)	$26,752,894	
Dividends (common at 4 per cent. annual)	15,227,812	
Dividends (outstanding subsidary stock)	25,101	
		42,005,807
Balance for nine months		$19,414,497

It will be understood that this immense net profit remains after charging current renewals and ordinary maintenance to operating expenses. The reserve funds are established to cover exhaustion of ore properties and general depreciation of plants, and to provide for extraordinary enlargements.

In the general balance sheet the item of property account stands out at $1,437,494,862. The stock is $1,018,386,322, almost equally divided between common and preferred. The bonds and debenture debt amount to $362,841,683. The current liabilities are upwards of $50,000,000. The inventories amount to over $95,600,000. The accounts and bills receivable are upwards of $48,000,000.

The report informs us that the business of the companies is practically on a cash basis. About 70 per cent. of the current monthly accounts is generally collected within 30 days.

The outlook for the year is very bright. It is believed that all of the works and other facilities will have to be run to their highest output. The business now booked is more than half the total mill capacity, while the heavier products are sold up to the capacity of the mills until nearly the end of the year. The belief is that the demand for the more highly finished products will be even greater than it was last year.

The report closes with a very interesting statement as to prices, namely, that the policy has been firmly held of not advancing prices, although higher prices have been offered by consumers to hurry delivery. It is believed that in the long run the advantage will be on the side of refusing to advance prices. The position of the companies has been for stability in prices, both of raw material and finished products, rather than to take advantage of immediate demand to make high prices. This is believed to have had a good effect on trade, to have helped restore confidence in the business situation, and to have helped create the present great demand for steel products.

A circular just issued from the office of the Superintendent of Motive Power and Rolling Stock of the New York Central & Hudson River Railroad announces the appointment of two supervisors of air-brakes for two grand divisions of the system. This is an interesting sign of the times, showing the steady growth of the appreciation of the importance of this element of the service. The names of the supervisors, and a statement of the territory over which they have jurisdiction, appear in another column.

NEW PUBLICATIONS.

The Block System of Signaling; including descriptions of Interlocking Machines. By Braman B. Adams, Associate Editor of the *Railroad Gazette.* Size 6 in. x 9 in.; 234 pages; 75 illustrations, and four plates. New York: The Railroad Gazette. Price, $2.

This book has been written in response to the demand for fuller and later information on the subjects treated in "American Practice in Block Signaling," which described in brief compass the methods and appliances used in block signaling in the United States 10 years ago. Beyond this brief statement, however, there is no comparison to be made between the old and the new work. The present volume describes the methods of manual block signaling in detail, and it has a chapter on the reasons for and against using the block system, as well as a consideration of the questions involved in deciding whether automatic signals will be preferable to manual in any given place. The development of manual block signaling, largely on roads doing a moderate business, many of them single-track, has been one of the most interesting features of railroad progress in this country during the past dozen years, and the description here given, of what has been done, constitutes, therefore, a chapter in current history.

The descriptions of the different mechanical and electrical devices used in automatic and manually controlled signals are illustrated by drawings. These include the elaborate "Sykes" apparatus of Coleman's design, used on the Providence division of the New York, New Haven & Hartford, and Grafton's three-position automatic, used on the Pittsburgh, Fort Wayne & Chicago. This latter was not included in Mr. Adams' series of articles which appeared in the *Railroad Gazette* in 1900. The portion of the book describing interlocking machines fills about 40 pages, and the descriptions cover not only the high and the low-pressure pneumatic and the all-electric, but also the old and standard machines—the Johnson and the Saxby & Farmer. No good description of the last-named is to be found in any other work now procurable.

The list of roads on which automatic block signals are used now includes 42 companies and the length of line so signaled is over 3,300 miles; or about a thousand miles more than we were able to show one year ago.

Water Filtration Works. By James H. Fuertes, M. Am. Soc. C. E. 12mo., xvi. + 280 pp.; 45 figures and 19 half-tone plates; Index. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 1901. $2.50.

Mr. Fuertes tells us in his preface that in 1839 James Simpson built a set of filters for the Chelsea Water Company, of London. Up to that date no investigations had been made as to what results could be got with filters. Twenty-seven years later Mr. Kirkwood visited Europe and studied the methods of filtration in use abroad, and later wrote a treatise on the filtration of river waters. Still later the results of the experimental work at the Lawrence experiment station, as published in the annual reports of the Massachusetts State Board of Health, aroused the interest of sanitary engineers and of some physicians; and many filter plants were established in the United States. In 1895 Mr. Allen Hazen published a book on the filtration of public water supplies. Beyond these sources of information the data and accumulated knowledge are confined practically to special reports not easily accessible and to the pages of current journals. Mr. Fuertes has set himself, therefore, to collect in convenient form the most valuable and useful knowledge on this important subject, up to date. His small book, by virtue of careful study and condensation and clear writing, is an uncommonly useful one.

The introductory chapter deals with generalities, as for instance, the relations of water and public health, the purification of water by natural agencies, protection of water supplies, etc. The succeeding chapters are intakes, sedimentation, and settling basins; the purification of water by slow sand filtration; the design, construction and operation of slow sand filters; the purification of water by rapid sand filtration; the construction and operation of rapid sand filters; conclusions from the preceding chapters, and, finally, a chapter on filtered water reservoirs.

It would be quite impracticable to undertake here to present even very briefly any of the views brought forward by Mr. Fuertes or of the information collected. We will conclude this notice, therefore, as we began, by saying that he has done an uncommonly good job of bookmaking, when we consider the space to which he confined himself—and after all small books are the best books, if they are well made.

Water-Tube Boilers. Based on a Short Course of Lectures delivered at University College, London. By Leslie S. Robertson. Octavo, 214 pages; 170 illustrations; index. New York: D. Van Nostrand & Co. 1901. $3.00.

Mr. Robertson says that he decided to collect, revise and publish these lectures because there is no popular book on water-tube boilers to which students and practical engineers can refer. He gives a general chapter on the classification and development of the water-tube boiler and another one on circulation, heating surface and draught; and then describes individual boilers, covering the field pretty completely in the engravings and short descriptions. One not familiar with the subject will probably be surprised at the great number of water-tube boilers that have been designed; and it will be convenient to many engineers to have these numerous designs collected in one handy volume.

In Mr. Robertson's descriptions he divides water-tube boilers broadly into large tube boilers and small tube boilers, giving a chapter to each. Another chapter is devoted to boiler accessories, covering reducing valves, steam separators, feed-water regulators, feed-water filters and heaters, etc. Finally, the author discusses briefly the advantages, disadvantages and durability of water-tube boilers. He closes with the broad general conclusion that from a military point of view the water-tube boiler has great advantages for naval use, quoting finally the words of Admiral Melville that "if the battle of Santiago taught nothing else it certainly made very clear the absolute necessity of water-tube boilers on our modern war vessels." An appendix is made up of the recent report of the committee appointed by the British Admiralty.

Metallurgy of Cast Iron. A Complete Exposition of the Processes Involved in Its Treatment, Chemically and Physically, from the Blast Furnace through the Foundry to the Testing Machine. By Thomas D. West. Third edition; 12mo.; 628 pages; illustrations and index. Cleveland: The Clevelanad Printing & Publishing Co. 1901. $3.00.

Mr. West's book has been known to iron founders for a number of years and is standard in its class. In the third edition considerable new matter appears on mixing, melting and testing cast iron. There are 20 new chapters, embodying the researches and experiments of the author since the appearance of the first edition in 1897. To provide space for this addition 13 chapters, treating of cupola practice, have been transferred to another book by Mr. West, namely, "The Moulder's Text Book." One of the new chapters treats of methods of treating test bars for the American Foundrymen's Association tests, with a compilation and summary of results. This matter is quite original and has been worked out in great detail. The tests are specially valuable in that each grade is poured from one ladle of iron inside of about 20 seconds, thus insuring that each set of bars shall be poured at one temperature. This is said to be a result never before reached in getting records of test bars. Mr. West writes from the standpoint of a practical moulder and foundry manager and is a keen and diligent as well as courageous student of his art.

TRADE CATALOGUES.

Stand-Pipes and Their Fittings.—The Best Manufacturing Company, Pittsburgh, Pa., has issued a pamphlet descriptive of the Gulland stand-pipe for watering locomotives. The pamphlet contains a description of the design and operation of this stand-pipe and of a number of special fixtures. The Gulland valve is shown by sectional view and described. The Heston valve, designed especially for high pressure, is also described, as is the Heston locomotive blow-off.

Centrifugal Pumping Machinery.—Messrs. R. D. Wood & Co., 400 Chestnut street, Philadelphia, have just issued a pamphlet designed to advertise centrifugal pumping machinery. It is a pamphlet of 100 pages with descriptions, tables of cost and capacity, and alphabetical index. The pamphlet has been designed rather as a general handbook than as a mere list of sizes, and to that end includes more descriptive matter and tables of general information than are usually found in catalogues. The examples shown are direct-connected, both with steam engines and electric motors, and are also belt-connected. There is a large range of sizes and styles.

The Pyle-National Electric Headlight Co., Chicago, has reprinted, as a pamphlet, the report and discussion at the last meeting of the Traveling Engineers' Association on the subject of "Locomotive Lights and Their Operation." Abstracts were published of this paper and discussion in our report of the meeting. The speakers at this meeting strongly indorsed the electric headlight.

The Champion Tool & Handle Works, Evart, Mich., sends its latest catalogue of lumbering tools. The factory is so situated as to make available an excellent quality of timber for handles. The catalogue contains illustrations and descriptions of a variety of appliances of use in handling logs and timbers.

Hibbard, Spencer, Bartlett & Co., Chicago, have issued a 7 x 8½-in. railroad catalogue of over 400 pages, showing materials adapted to the railroad trade, which this company is able to furnish. In general this is a catalogue and price list of hardware.

The C. A. Manufacturing Co., Austin, Texas, sends a small pamphlet relating to its "C. A." wood preserver, a heavy dark brown oil stain which is applied with a brush; or the timber may be immersed in the liquid. Numerous letters are published from people who have used this preserver. A second pamphlet is a reprint of a recent paper by E. P. Schoch, Instructor in Chemistry at the University of Texas.

The Otto Gas Engine Works, Chicago and Philadelphia, has issued a 7 x 10-in., 72-page illustrated catalogue of railroad water station appliances. This catalogue is arranged to show present methods of applying gas and gasoline engines to pumping devices, together with other railroad appliances which the company is prepared to furnish. The engravings show Otto engines of various capacities connected to centrifugal pumps, pumping jacks and Curtis pumps with detail information as to the plant required for various capacity water stations; also portable pumping and well-drilling plants; air compressor plants mounted on tool cars; direct-connected and belted generators driven by Otto engines; steel, cement and wooden water tanks; water cranes and pipe fittings and valves. Price lists of all water station appliances are included. Special catalogues for either gas or gasoline engines will be furnished upon application.

The Railway Appliances Co., Old Colony Building, Chicago, has issued a small pamphlet descriptive of the "R A" car mover. This is so designed that the force applied to the lever also acts to clamp the bar to the rail and prevents slipping. It is said that one man can move one car almost as fast as he can walk, and two or more cars are often moved by one man. The tool weighs 23 lbs.

The Victor Cooling Tower Co., St. Louis, Mo., send a pamphlet relating to the Victor atmospheric water cooling system and Victor combined condenser and vacuum pump. In the Victor cooling tower the aim has been to make a simple construction and a tower easy to operate and clean, and at the same time light enough to place on the roof of a building or other structure. Several forms of these towers are illustrated and described in detail.

Natural Gas and Other Fuels—A Comparison.

There has been much debate concerning the relative value of gaseous and solid fuels when used in stoves such as are commonly employed in heating the living rooms of dwellings, and until recently but few facts have been available. During the past year, however, Mr. Samuel T. Murdock, Secretary and General Manager, Lafayette (Ind.) Gas Company, has interested himself in the matter and has conducted an elaborate series of

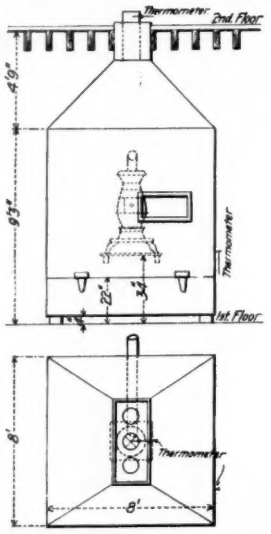

Fig. 1.—Tests of Fuel Value of Natural Gas.

tests, from the results of which we are permitted to abstract the following:

Relative Values.—In the early discussion of the relative value of different fuels, the problem appeared to be one of ascertaining the heating value of a given quantity of the different fuels involved, the assumption being that the effects produced would in each case be directly proportional to the heat available. For example, a thousand feet of natural gas from the Indiana and Ohio fields, under the ordinary meter conditions of pressure and temperature, contains approximately one million British thermal units. A ton of the better class of Indiana coal contains approximately 24 million British thermal units. Upon this basis, 24,000 ft. of gas equal one ton of coal. If coal costs $1.00 a ton, gas would be worth 4.17 cents per 1,000 cu. ft.

Incidental Heat Losses.—It soon became evident, however, that under conditions prevailing in practice, a larger proportion of the total heating value of gas is made available for purposes of heating, than of the solid fuel. There are several reasons why this should be so. First, the mixing of the combustible properties of the fuel with the oxygen of the air is more complete when gas is employed than when solid fuel is used. As a consequence, the process of combustion is more complete and efficient. Again, where gas is used, the heat passing up the chimney is small, and in some forms of stoves is nil, but with coal must necessarily be large, for with coal strong currents of air are required to promote the combustion and to prevent smoking. It will be shown that under favorable conditions, nine-tenths (0.9) or more of the total heating value of gas is made to appear in effects produced upon the air of the room which is being heated, while anthracite coal in a base burner yields to the surrounding air only about four-tenths (0.4) of the heat it contains.

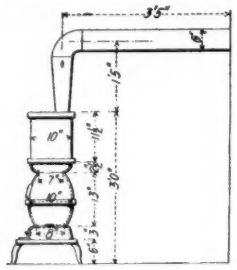

Fig. 2.—Bituminous Stove No. 1.

Number.	Conditions.	Lbs. Coal burned per hour.	Thermal Units radiated. Per minute.	Per ton.
1	Pipe damper open 45°. Stove damper open 1/10.	2.44	217.5	10,687,950
2	Damper open, Thick fire.	2.60	149.4	7,010,744
3	Pipe damper open 45°. Stove damper open ½.	3.42	247.3	8,665,392
4	Pipe damper open. Stove damper open 1/3.	4.00	265.7	7,971,000
5	Dampers open.	4.44	281.8	7,608,600

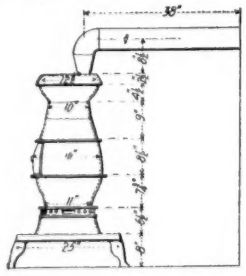

Fig. 3.—Bituminous Stove No. 2.

Number.	Conditions.	Lbs. Coal burned per hour.	Thermal Units radiated. Per minute.	Per ton.
1	Pipe damper varied. Stove damper open.	3.78	418.0	13,270,600
2	Pipe damper 30°. Stove damper 1/9 open.	4.87	479.5	11,815,839
3	Pipe damper 45°. Stove damper open.	5.65	630.4	13,403,000
4	Pipe damper 45°. Stove damper open.	7.25	627.7	10,390,000
5	Pipe damper open. Stove damper 1/9 open.	9.73	793.9	9,793,450
6	Pipe damper 45°. Stove damper open.	12.50	1,056.1	10,138,560

A Reliable Basis.—The need of a reliable basis of comparison from which to determine the relative money value of gas and coal is evident, and to secure such a basis the experiments herein described were undertaken.

Apparatus and Methods.—To afford the necessary facilities there was first selected a large two-story store room. In the lower story of this there were constructed three small houses within each of which stoves could be placed. The general arrangement and principal dimensions of these houses, or calorimeters, as they may be properly called, are shown by Fig. 1. At the base of each house, provision was made for the admission of cold air which, rising about the stove, became heated and was finally discharged from the top of the house into the second story of the building. Under working conditions cold air was drawn in at the bottom, heated by the action of the stove and discharged into the upper story of the building from which point it was allowed to waste. From observations made to determine the weight of air passing the calorimeter and its rise in temperature, it was possible to calculate the number of thermal units taken up by air. It was assumed that the air of the calorimeter could neither receive nor lose heat except through the influence of the stove under test. The observations, therefore, gave a measure of the heat radiated by the stove.

Three calorimeters were employed in order that three stoves might be subjected to test at the same time and the progress of the work hastened.

The walls of the calorimeters were designed to be impervious to the passage of air or heat. They were constructed of a double thickness of ⅞-in. matched pine flooring with a layer of heavy paper between the courses. It was thought that this construction justified the assumption that no heat which might be imparted to the air within the calorimeter could escape except by a pipe especially provided at the top. Scientifically speaking, there doubtless were some slight losses of heat through the walls of the calorimeter, both by leakage and by radiation, but they were small in value and a correction for them, if attempted, would apply equally to all tests. As comparative values only are required, such losses need not be regarded.

A hinged door extending across the lower portion of one side of each house served to admit the attendants having charge of the stove. Observations were made at regular intervals to determine the temperature of the air delivered from the discharge pipe above, and the velocity of the air discharged. The temperatures were determined by means of accurate thermometers located as indicated by Fig. 1. The velocity of the air discharged was obtained by means of a sensitive anemometer which was supported over the center of the discharge pipe by means of two very fine steel wires especially provided. The method employed in deducing results from these observations will be hereafter described.

The quantity of fuel consumed by the gas stoves was determined by reading the statement of an accurate meter every hour during the test. The weight of coal burned in the coal stoves was found by bringing the fire at the end of the test to the same condition as in the beginning, and by weighing all coal fed to the stove during the test. It may be remarked that in all cases the stoves were handled in the same manner as they would have been had they been in a dwelling house. Tests were usually of 10 hours' duration.

Reduction of Results.—The theoretical considerations which serve in converting observed results into British thermal units radiated by the stove, may be stated as follows:

Let:

a = velocity of air discharged. Feet per minute.
t = temperature (°F.) of air discharged.
T = temperature (°F.) of air supplied.
p = atmospheric pressure. Pounds per square inch.
S = specific heat of air at constant pressure. (.2375.)
d = weight of 1 cu. ft. of air at temp. t.
A = area of discharge pipe. Square feet.
H = number of British thermal units radiated from stove and discharged from calorimeter per minute.

Then:

Volume discharged per minute = Aa cu. ft.
Weight discharged per minute = dAa lbs.

Therefore:

$$H = dAa\,(t - T)\,s \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

But: (From Law of Perfect Gases.)

$$d = 2.7\left(\frac{P}{t + 460.7}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Substitute (2) in (1):

$$H = 2.7\left(\frac{P}{t + 460.7}\right) Aa\,(t - T)\,s \quad \ldots\ldots\ldots (3)$$

Substituting values of p, A and s in (3):

$$H = \frac{5.335a\,(t - T)}{t + 460.7} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

By substituting the average values of the observed results in formula No. 4, the number of British thermal units radiated by the stove per minute is obtained. This, in turn, is easily transformed to show the number of thermal units radiated for each foot of gas burned, or, in the case of coal, for each pound of coal consumed.

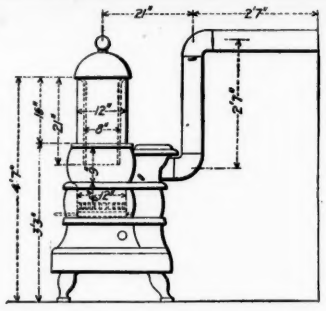

Fig. 4.—Anthracite Stove, No. 1.

Number.	Conditions.	Lbs. Coal burned per hour.	Thermal Units radiated. Per minute.	Per ton.
1	All dampers shut.	2.54	194.1	9,191,605
2	Front stove damper shut. Pipe damper 15°.	2.66	240.4	10,859,108
3	All dampers shut.	3.17	231.5	8,755,909
4	All dampers open.	3.26	279.6	10,279,494
5	Front stove damper shut. Pipe damper 45°.	3.40	225.5	7,958,346
6	Front stove damper open. Pipe damper 50°.	3.46	295.6	10,161,240

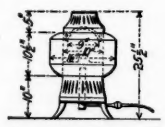

Fig. 5.—Gas Stove, No. 1.

Number.	Conditions of valve.	Gas burned per hour, cu. ft.	Thermal Units radiated. Per minute.	Per 1,000 feet gas.	Press. of gas in ins. of water
1	Open very little.	6.93	103.1	890,784	7.5
2	Open 1/6 turn.	17.5	245.4	840,740	7.9
3	Open 1/3 turn.	18.9	268.3	851,584	7.4
4	¾ open.	20.9	286.8	821,510	7.5
5	Wide open.	26.9	372.2	828,517	7.0
6	Wide open.	28.9	388.4	807,250	8.1

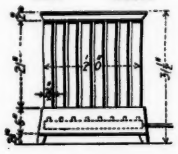

Fig. 6.—Gas Stove, No. 2.

Number.	Conditions of valve.	Gas burned per hour, cu. ft.	Thermal Units radiated. Per minute.	Per 1,000 feet gas.	Press. of gas in ins. of water.
1	1/6 open.	9.66	123.88	768,917	8.8
2	½ open.	16.08	233.40	871,048	4.0
3	⅔ open.	18.66	255.80	822,508	2.8
4	Open.	30.98	387.17	749,853	3.5
5	Open.	41.12	375.57	548,013	5.9

It should be noted that the capacity of a given stove is indicated by the number of thermal units radiated per minute, while its efficiency is measured by the thermal units radiated per unit quantity of fuel.

Soft Coal.—The fuel used for all coal tests was Pittsburgh block. Two different stoves were experimented upon. These, with a summary of the data derived from them, are shown by Figs. 2 and 3. It will be seen that each stove was subjected to a series of tests, each varied from others of the series, in its rate of combustion, and this was controlled by the position of the dampers.

Referring first to stove No. 1 (Fig. 2) it will be seen that the best result is in the radiation of about 10½ million thermal units per ton. It will be seen, also, that as the damper is opened, the total heat developed increases, but the heat radiated per pound of coal diminishes. The exception is to be found in Test 2. While more coal was burned for this test than for Test 1, it shows less heat radiated. This inconsistency is accounted for by the fact that a very thick fire was carried in the stove for Test 2 and, as a consequence, the fire was at all times smoky, the combustion evidently being somewhat imperfect.

The tests of stove No. 2 (Fig. 3) were more satisfactory than those of Test No. 1, the reason being that the stove is a much larger one. Its larger size is shown not only by its increased dimensions, but also in the increased amount of coal burned, and by the greater quantity of heat radiated per minute. Its efficiency is also

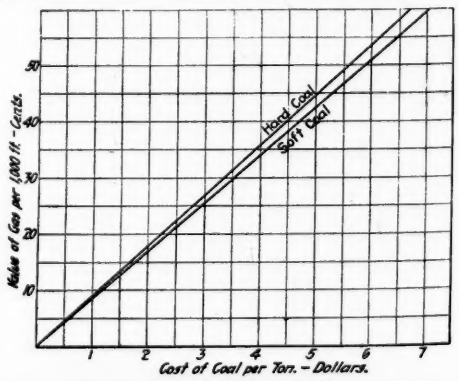

Fig. 7.—Relative Value of Fuels.

greater, it giving a maximum radiation of 13 million B. T. U. per ton of coal, but this, as in the case of No. 1, is reduced by opening the dampers.

For the purpose of securing a representative measure of the performance of stoves burning bituminous coal, which can be used as a basis of comparison, the value of 10 million B. T. U. per ton of coal has been chosen. This is higher than the average values obtained from the smaller stove and lower than the average obtained from the larger stove. It is, however, a value which falls within the limits covered by the results obtained from both stoves.

Anthracite Coal.—The coal used for the several tests was of the size known as anthracite nut. It was burned in an ordinary base burner stove of the dimensions shown by Fig. 4. Six tests were made, the limits in the weight of coal burned per hour being 2.54 lbs. to 3.46 lbs., respectively. The number of thermal units radiated per minute, as shown by the table of Fig. 4, varied from 194 to 293 and the thermal units radiated per ton of coal, from 8.8 millions to 10.9 millions. The average of the several results gives 9.5 million thermal units radiated per ton of coal, a value which is slightly lower than that obtained for Pittsburgh block. The relative results, however, are not a direct measure of the relative values of the two fuels, but of the efficiency of different stoves as well. It will hereafter be assumed that this is a fairly representative result to be obtained from anthracite coal when burned in an ordinary base burner.

Gas Stoves.—Two stoves of this type were tested, the first being known as the "Omega" stove and the second as a gas "radiator." These, with the data derived from them, are given as Figs. 5 and 6.

The Omega stove (Fig. 5) provides a highly heated chamber in which combustion takes place, the process being so complete that while no chimney is used, no perceptible odor arises from the operation of the stove. The action of the stove was remarkable, both as to its power and with reference to the purity of the air in the room in which it was operated. The rate of combustion during the progress of the tests varied from 6.93 to 28.9 cu. ft. of gas per hour, values which represent the entire range of the capacity of the stove. The number of thermal units radiated per minute varies from 103 to 388 and the number for each 1,000 ft. of gas burned from 807 thousand to 891 thousand with a representative value for all tests of 850 thousand.

The gas radiator (Fig. 6) consists of eight elliptical Russia iron tubes beneath each of which is a small burner, from which a flame is sent up the tube. Five different tests were made upon this stove, the rate of combustion varying from 9.66 to 41.12 cu. ft. of gas per hour, and the number of thermal units radiated per minute varying from 124 to 387. The thermal units radiated per 1,000 ft. of gas burned was found to vary from 548 thousand to 871 thousand. The results, however, unlike those from the Omega stove, disclose a variable efficiency, the most satisfactory performance being obtained when from 15 to 20 ft. of gas were burned an hour. At other rates of consumption, the combustion appears to be less complete. The fact should be emphasized that this stove when operated under conditions most favorable to efficiency, radiated about the same amount of heat as the Omega stove, namely, about 850 thousand B. T. U. per 1,000 ft. of gas. This value, which is common to the performance of both the Omega stove and the gas radiator, may be accepted as fairly representing the performance of gas stoves of good design.

It is proposed in the comparisons which are to follow, to accept 850 thousand B. T. U., the performance of the gas stoves tested, as a standard upon which to base comparisons.

A Summary.—The following is a summary of facts already presented:

Thermal units radiated by gas stove per thousand feet of gas burned	850,000
Thermal units radiated by soft coal stove per ton of coal burned	10,000,000
Thermal units radiated by hard coal stove per ton of coal burned	9,500,000

Relative Values as Shown by Experiments.—The results presented in the preceding paragraph show that 11.2 thousand feet of gas burned in a gas stove is the equivalent of one ton of hard coal burned in a base burner; also, that 11.8 feet of gas burned, as stated is the equivalent of one ton of soft coal. On this basis, if hard coal is worth $1 per ton, gas is worth 8.9 cents per 1,000, and if soft coal is worth $1 per ton, gas will be worth 8.5 cents per 1,000. This statement does not take account of incidental losses to which solid fuels are subject in passing from the seller to the consumer's stove. Its significance is shown graphically by Fig. 7.

Light Railroads in Great Britain.

BY C. H. GRINLING.

Whilst the wealthier and more thickly-populated parts of the United Kingdom are provided with the most costly and in many respects the best-equipped railroads in the world, there is some lack of adequate provision for transportation in the poor and thinly populated districts. In Ireland, where the largest tracts of poverty-stricken territory occur, it has been necessary for the State to supplement private enterprise by the construction out of the public purse of "light railroads" which, however, are worked by the companies without Government aid. Under the Light Railways (Ireland) Act of 1889 about 300 miles of these lines have been provided, chiefly on the western parts of the island. In Great Britain not only has the State never constructed railroads, but, until quite recently, it has shown much reluctance to facilitate the compulsory acquisition of land by railroad companies, or to relax safety requirements in favor of lines of light traffic. The necessity of obtaining Parliamentary authority for the compulsory acquisition of land and of submitting the works and equipment to a Board of Trade inspection before any line could be opened combined to discourage railroad building in districts where economy, both of construction and working, was essential to financial success.

It was this state of affairs which led to the passing of the Light Railways Act of 1896, the object of which was to do for England and Scotland what the act of 1889 was doing for Ireland. It was not, however, considered that a large expenditure of public money was necessary in the case of the two richer countries, and only £250,000 was provided for free government grants, a further sum of £750,000 being made available for loans at a rate of interest which would involve no loss to the public exchequer.

It may be said at once here that the policy of providing for State loans to railroad companies has proved a failure in Great Britain, not one such loan having been negotiated during the five years during which the Light Railways Act has been in force. On the other hand the amount allocated to free grants has proved inadequate, and in reviewing the act for a further term of five years it is proposed to extend the limit for special advances to £750,000. It has been pointed out that as light railroads in Ireland have been constructed **wholly out of public** funds, it is unfair that State aid to similar undertakings in as needy districts of England or Scotland should be limited to one-third of the engineer's estimate. The British Act, however, provides for advances by the local authorities, either by way of a loan or as part of the share capital, and several undertakings have been assisted in this way, either in addition to, or in lieu of, State aid. Latterly, too, County Councils in various parts of the country have shown considerable activity in themselves promoting light railroads.

But the main object of the Light Railways Act of 1896 was not State aid but the removal, or lightening, of restrictions upon private enterprise. With this view a special tribunal was created under the title of the Light Railway Commission to which Parliament delegated the power to authorize the construction of railroads (and the compulsory acquisition of land for the same) under conditions which were rather loosely defined. As, however, all schemes which are competitive with existing railroads cannot be dealt with by the commissioners, but have to be submitted to Parliament, the authority of the new tribunal is limited in practice to lines of comparatively small extent.

On the other hand, there is nothing in the act to differentiate a light railroad from a street tramway, and it was quickly discovered that the new law offered several advantages to tramway promoters which were not obtainable under the Tramways Act proper. Moreover, the passing of the Light Railways Act happened to coincide with the commencement of the era of electric street traction. Thus it has come about that more than half of the lines promoted under the new legislation have been street railroads. Out of 249 schemes submitted to the Light Railway Commission since the establishment of that tribunal, 137 have been tramway schemes and only 112 applications for light railroad proper. In cases, however, where the proposed line was wholly within a town the Commissioners have hitherto refused to grant an order; but in the bill which has been drafted for continuing the Light Railways Act for a further term of years, it is proposed to empower the Commission to "authorize the making of a light railroad on any highway." Under these circumstances, and having regard to the great activity now being displayed, both by local governments and private companies in the promotion of electric tramway schemes, it is certain that the Light Railways Act will play an even larger part in the future than in the past in facilitating this class of enterprise. At the same time the interests of the existing steam railroad companies are pretty well safeguarded by the proviso already referred to that schemes of sufficient magnitude to be competitive with those undertakings must be submitted to Parliament.

Of the light railroads proper authorized under the act a number are now completed and at work. Nearly all of these are operated—and some of them are both owned and operated—by the existing railroad companies. A specimen of the kind of the line which the promoters of the act wished to encourage is the Leadhills Light Railway in Scotland, part of which has been recently opened for traffic by the Caledonian Railway Company. The total cost of the 7½ miles of this line is expected to be about £62,000, about £7,000 of which was for one viaduct of eight arches. This is 480 ft. long and 80 ft. at its greatest height. There are two other bridges on the line, one of which has two spans of 50 ft. All these structures are of concrete, the viaduct being faced with red bricks. The permanent way is laid with 80-lb. rails, 32 ft. long and attached to cross-sleepers, 2 ft. 8 in. apart by 35-lb. cast-iron chains. These were partially used rails supplied by the Caledonian Company and are unnecessarily heavy, as the maximum allowable axle load is 14 tons only. The speed of the trains is limited to 20 miles an hour, and stoppages are made at any place en route to suit the convenience of the passengers, the carriages being provided with side steps for this purpose. The line is worked by train staff on a single section, but there is a passing place at the intermediate station (Leadhills) as well as at the terminus. The platforms are on the same level as the rails and the station buildings are mere shanties. The one engine at present used on the line is an ordinary four-wheeled coupled side-tank locomotive, fitted with a cowcatcher, both front and rear. The line is unfenced, but cattle guards are provided where it cuts a boundary fence or crosses a road. The gage is the standard, 4 ft. 8½ in., and this is the case with nearly all the light railroads at present constructed in Great Britain. There is no disposition to seek economy at the cost of a break of gage.

It should be added that the Board of Trade has power to order a light railroad to be as fully equipped from a safety point of view as an ordinary line, i.e., the Board can order bridges instead of level crossings, gates instead of cattle guards, raised platforms, etc. All depends upon the discretion of the government inspectors.

Michigan Railroad Commissioner's Report.

Railroad Commissioner C. S. Osborn, of Michigan, has issued an abstract of the twenty-ninth annual report of his office. Following are extracts:

The year 1901 marks the greatest volume of business ever transacted by the railroads of Michigan and also marks the greatest amount of money expended for operation and for improvement. The roads were taxed with a volume of business almost beyond their capacity. Although there was a great shortage of cars and frequent inadequacy in other facilities, no unusual embarrassment in traffic occurred. It has been a year of hard work for railroad employees, but it has been a year of good wages and happiness. During the year grades have been reduced and curves straightened, the companies realizing the importance of fast time and economy in operation. Much through freight business between the East and West is carried in connection with the several car ferry lines across Lake Michigan. These car ferry lines have long since passed the experimental stage, and by their successful operation during all seasons of the year, have succeeded in demonstrating that they are a great success. There is no force in the old argument that Michigan could never become a factor in the through carrying business, on account of being so nearly surrounded by water. By the use of the car ferries the lines running through this State have proved themselves superior to those of our sister States in facilities for this very desirable traffic.

For the first time in the history of Michigan, Jan. 1, 1902, will see all of the steam railroads of the State organized under the general railroads laws upon the same footing, the laws repealing the special charters of the Michigan Central, the Detroit, Grand Haven & Milwaukee, and the Erie & Kalamazoo having taken effect Dec. 31.

There was the usual record of accidents and some of them were dreadful in the extreme. It is a charge that one should hesitate to make, but nevertheless the facts suggest it, that the railroads have possibly given more attention to the exactions of traffic and the demands of improvement than they have to absolute carefulness of operation. . . . It seems to be a fact that railroad managers are now fully determined to adopt all of the safeguards that can be used in harmony with practical operation. The most terrible accident of the year occurred at Seneca, Nov. 27.

It seems to be very difficult, if not quite impossible, to determine the number of lives lost in this accident, as a number of the passengers were emigrants, about whom little seems to be known. In the official report the number of killed is given as 19 passengers and three employees, and the number of injured as 49. From all information available, it appears that no law was violated. . . . The standard code of train rules is the recognized basis upon which all rules are founded, being changed only slightly by each company to suit special conditions. It is considered inexpedient, if not quite impossible, to secure the adoption of an absolutely uniform code of rules, but it certainly is desirable to profit by experience. . . . With this object in view a circular letter was issued to the managers of railroads asking about the advisability of making certain changes in the code, and it is hoped that the agitation of the question may result in the adoption of amendments to the rules which will result in greater safety. Mr. A. C. Miller, chief despatcher of the Chicago, Burlington & Quincy, suggests signals showing automatically and continuously in the cab of the engine close to the eye of the engineer.

Owing to the great increase in the amount of business done by the railroads in this State, and the consequent increase in the danger of accidents I would recommend that the attention of the Legislature be called to the advisability of enacting legislation looking to the adoption of a block system upon all railroads in the State.

The position taken by this department in opposition to grade crossings of electric and steam roads has been consistently maintained. The builders of electric lines appear to recognize in this position an established rule of the State, and they also seem to have decided that a separation of the grades is in their own interest, and all or nearly all lines contemplated are laid out with a view to the avoidance of grade crossings.

The construction of electric railroads in this State continues with unabated vigor. A number of important lines are now in the course of construction, reaching all

the more important cities of the State. I desire to repeat the recommendation that electric roads be brought under the jurisdiction of this department.

A number of accidents upon electric railroads have been reported during the past year. Dangerous conditions are multiplying rapidly. It is important that legislative action upon this subject be taken at the earliest possible moment.

. . . I am very decidedly of the opinion that no [steam] railroad company should be permitted to construct its line across an existing highway and that no new highway should be opened across a railroad track until the location of the same has been passed upon and approved by the Commissioner of Railroads or some other State authority.

In a number of instances confusion has arisen on account of some conflict of authority in the matter of protection required at street crossings of railroad tracks in cities. While the general railroad law makes it the duty of the commissioner of railroads to order gates, flagmen or bells at crossings, a similar authority is vested in the common council in many cities and villages, but it would appear to be more properly a matter to be handled by State instead of local authority.

It has been suggested that locomotive engineers, before being permitted to take charge of a locomotive, should be required to pass an examination and secure a license from State authority. The railroad companies have adopted requirements that have resulted in securing a very high class of service, but it is still possible for incompetent persons to be employed in this class of service.

It might be well to consider the advisability of adopting some plan for raising the standard of service among other employees who are directly connected with the operation of trains. A great many railroad accidents are caused, not by any apparent defect, either in the laws of this State, or the regulations of the railroad, but by ignorance, incompetency or carelessness.

Live stock cars are not properly warmed and ventilated in the winter. While national legislation would reach this to better advantage, no doubt, it would be a pioneer step in the right direction if Michigan would pass a law requiring this.

It is suggested that the Legislature of Michigan take under consideration the question of limiting the capitalization of new railroads.

On a number of the more important railroads a plan has been adopted for the organization among employees of associations for the relief of such employees when disabled by accident or illness. Aside from the financial benefit a relief organization tends to bring the employees into more friendly relations with the company.

The total amount of taxes computed against the railroad companies doing business in this State upon the income of such companies for the year 1900, such taxes becoming due and payable July 1, 1901, was $1,353,549, or $167.85 per mile of road, as compared with $1,240,845 for the previous year.

At the last session of the Legislature a bill was passed providing for the taxation of railroad property upon its value, as determined by the board of State tax commissioners, instead of upon the basis of income, as at present. Therefore, the computation of railroad taxes will no longer be a part of the duties of this department.

In this report will be found a detailed statement as to the condition of the railroad properties in the State, together with a report of an inspection of all the lines. There is also given a description of the protection required and provided at grade crossings of electric and steam roads, and a description of the different systems of block signaling that have been adopted.

According to the annual reports received from the railroad companies for the year ending Dec. 31, 1900, the total main line mileage operated in this State was 8,058 miles; adding to this the mileage built in 1901 the total in the State is 8,308 miles.

TECHNICAL.

Manufacturing and Business.

The Rand Drill Company, of New York, has opened an office at 710 Park Building, Pittsburgh, with F. C. Weber in charge. The company makes air and gas compressors, blowing engines, rock drills and quarry and mining machinery.

J. H. Perkins, for many years manager of the Puget Sound Machinery Depot, at Seattle, Wash., has sold his interests and will soon form a new company with a capital stock of $100,000, to establish a plant to make machinery and mill supplies.

The King Bridge Company has consolidated its Boston and New York offices and hereafter all New England business, in addition to business in New York and vicinity, will be attended to by George E. Gifford, eastern representative, at 120 Liberty street, New York City.

Spencer Otis, who was Chicago representative of the Rhode Island Locomotive Works prior to the consolidation of the eight locomotive works into the American Locomotive Company, has been appointed the Western representative of the American Locomotive Company, with office in the Fisher Building, Chicago.

The Hewitt Manufacturing Co. plans to greatly increase its plant at Chicago. With this in view it has bought about two and one-half acres of land at the southeast corner of Emerald avenue and Fortieth street, and a brass foundry will be built, 250 x 150 ft., costing about $100,000. It is expected to have the building finished by May 1.

Among the large orders now being executed by the Niles Tool Work Co., are orders for the Lehigh Valley, the Baltimore & Ohio, Mexican Central, Union Pacific and other railroads, running from $50,000 to $280,000 each. The company is also equipping the new shops of the Central Railroad of New Jersey, at Elizabethport. The machines are now being shipped to the latter point.

The Arkansas & Choctaw has bought from F. M. Hicks, of the Hicks Locomotive & Car Works, 10 60,000 lbs. capacity flat cars for immediate delivery. The Northwestern Lumber Co., of Eau Claire, Wis., has placed an order with the same company for 15 50,000 lbs. capacity flat cars, for immediate delivery, and the Cleveland Cliffs Iron Co., Gladstone, Mich., has bought a 17 x 24-in. four-wheel switch engine of F. M. Hicks, for February delivery.

The Automatic Railway Switch Co. was incorporated in New York State, Jan. 29, with $250,000 capital, to make automatic railroad switching devices and other railroad supplies. The incorporators are: Francis J. Nekerada, 309 Broadway, New York; Gertrude Driggs, 1647 Third avenue, New York; Anthony S. Ambrose, 25 Avenue A, New York; Thomas S. Patterson, 80 Lawrence street, Flushing; and Theron Davis, 52 William street, New York.

The following orders have been received by F. M. Hicks, of the F. M. Hicks Locomotive & Car Works: The Bessemer & Lake Erie has ordered six passenger coaches for March and April delivery; J. S. Crews, Albany, Ga., 15 box cars for immediate delivery; the Acetylene Gas Co., Chicago, a coach to be fitted up and used as an exhibit car for its acetylene gas apparatus, and the Louisiana & Arkansas Railroad has ordered another 17 x 24-in., 50-ton freight engine for immediate delivery.

The Industrial Water Company, 15 Wall street, New York, have received a contract from the American Beet Sugar Company, for one of their water softening plants, having the capacity to treat one million gallons of water in 24 hours. The plant will be installed at Oxnard, Cal. The same company also reports the sale of a machine to the Standard Oil Company, of New York, Pratt Works, Long Island City. This machine has a capacity of treating 10,000 gallons of water per hour.

Pawling & Harnischfeger, Milwaukee, Wis., makers of electric cranes, say that business conditions are satisfactory, and more than usually so in the volume of orders. The firm has obtained what is perhaps the largest order ever placed by one company at one time for electric cranes. This was placed by the Allis-Chalmers Co., Edw. P. Allis Works, Milwaukee, Wis., for the new factory buildings at West Allis, and specifies 35 cranes ranging in capacity from five to 75 tons. In addition to this Pawling & Harnischfeger have recently booked orders for 43 electric cranes from other firms.

The Railway Appliance Company, of Albany, N. Y., has been incorporated to make railroad supplies, particularly signal lights. The directors are: Alex Selkirk, Frank E. Selkirk, John A. Selkirk, John J. Sill, Alfred C. Rautsch, John A. Howe, John A. Howe, Jr., Howard N. Fuller, all of Albany, and Edwin D. Howe, of Valatie, N. Y. The company will make a patented signal light to be used by street railroads. The device consists of a many-colored strip of celluloid, which is run from one roller to another by turning a peg to bring any color desired before the light. It is said to give a bright color and its cost is small.

The Magnolia Metal Company has bought a large office building and factory at 113-115 Bank street, New York City, and will occupy it after Feb. 1. The factory will be fitted with the most modern appliances for manufacturing on a large scale and at low cost. The company is prepared to turn out promptly all orders for its specialties, magnolia, defender, mystic and adamant metals, and to furnish all grades of babbitt metals of superior quality from genuine to No. 4, as well as solder, electrotype, stereotype, linotype metals, special metals, railroad brasses, etc. With factories at New York, Stirling, N. J., Chicago and Montreal, the facilities for manufacturing and quick delivery of babbitt metals are unequaled.

The United States Engine Company, organized at Parkersburg, W. Va., last summer with a capital of $150,000, has elected officers as follows: H. P. Boyd, President; Thomas Gartlan, Vice-President; J. F. Boggs, Treasurer, and Daniel L. Reese, Secretary. The company will make steam and gas engines, especially for the oil and gas trades, as well as a general line of goods used in these industries, and is now building and equipping a foundry, 70 x 140 ft.; a machine shop, 80 x 160 ft.; blacksmith shop, 40 x 80 ft., and a two-story wood-working shop, 40 x 80 ft. The two larger buildings are of steel and brick, with concrete floors. The company expect to have the works in operation not later than May 1.

Iron and Steel.

A certain complication must be faced by the United States Steel Corporation as regards steel billets. The corporation some time ago announced that it could no longer supply billets to outside manufacturers, and now it is announced that the company is unable to meet the demand from its own plants. Outside companies have imported billets from Germany and a quantity of billets has been sent to the United States by the Dominion Iron & Steel Co., of Canada, and it is quite probable that the importations will have to be increased. Many concerns announce that their entire output is sold from four to six months in advance. Independent steel companies are also beginning to find trouble in supplying their needs of ore. The large companies owning their ore supplies are not disposed to share with the outsiders.

Eastern producers have advanced pig iron 50 cents a ton, putting Eastern prices on a more equal basis with Western and Southern quotations. The minimum quotation of No. 2 foundry iron at the furnaces of the Lehigh Valley is now $16.50 a ton. It is estimated that between 65 and 70 per cent. of the possible production of the merchant furnaces of the United States during the current year has been sold.

Sixteen independent steel sheet makers met in Pittsburgh, on Feb. 3, and took preliminary steps to organize an association to control joint trade interests. One object is to have representation at the wage conferences with the Amalgamated Association, the wage scale of which is recognized by a number of the sheet makers, who have no voice in the wage settlements. It was proposed also to arrange for a supply of raw materials. No final action was taken on any of the propositions. The meeting adjourned to a call of Chairman A. F. Baumgarten, of Pittsburgh.

The American Turn Lathe Co., of Wilmington, Del., is building a $250,000 plant at Warren, Pa.

The Greensburg Foundry & Machine Co., of Greensburg, Pa., was incorporated in Pennsylvania, Jan. 31, with $10,000 capital.

George Herrick Duggan, Chief Engineer of the Dominion Bridge Co., has been appointed Consulting Engineer of the Dominion Iron & Steel Co.

H. R. Barnhurst, formerly with the Erie City Iron Works, at Erie, Pa., has been appointed Superintendent of the Milwaukee (Wis.) plant of the Allis-Chalmers Co.

The Pennsylvania R. R. is said to be asking bids for the sale and removal of the old Rockville bridge over the Susquehanna River, which will be abandoned in a few months. It contains about 500 tons of metal.

The Ohio plant of the National Steel Co., at Youngstown, Ohio, broke all its records on Jan. 22. In 24 hours 1,123 ingots were turned out, amounting to 2,462 tons. The best previous record was made on Dec. 12, when 2,440 tons were produced.

The Best-Scott Foundry Co., which will make castings of all kinds, has been organized at Warren, Pa., with John Best as President; J. A. Viele, of New York, Secretary and Treasurer, and Robert Scott, Manager. The company is placing contracts for machinery and expects to get the plant in operation in about two months.

The Lorain Steel Company, of Lorain, Ohio, is about to ship 1,200 tons of rails and 50 tons of special work to New Zealand, for use by the Auckland Electric Tramways Company, Ltd., controlled by the British Electric Traction Company, Ltd. The contract for building this road has been secured by J. G. White & Co., of New York.

The Cambria Steel Company has issued a report covering the period from Aug. 15, 1901, to the end of the fiscal year, Oct. 31, 1901, which shows gross earnings of $3,987,435, operating expenses of $3,166,078, net income from all sources of $819,391, and, after depreciation and other charges, a balance to the credit of income account as of Oct. 31 of $459,128.

At a recent meeting of the stockholders of the Youngstown Iron Sheet & Tube Co., held at Youngstown, Ohio, the recommendation of President Wick and other members of the board of directors to increase the capital stock from $2,000,000 to $4,000,000 was favorably acted upon. It was also decided to increase the board of directors from nine to eleven. The new directors chosen were H. G. Dalton, of Cleveland, representing Pickands, Mather & Co. and James Parmelee, of Cleveland. S. V. Huber & Co., of Pittsburgh, consulting engineers, will prepare plans for a new open-hearth plant.

New Roller Bearing Company.

The Wright Soper Roller Bearing Co., of Buffalo, was incorporated in New York State, Feb. 3, with a capital of $900,000, to make roller and other bearings for tools, and machinery. The directors are: Lewis J. Bennett, W. Hamilton Wright, Chester G. Smith, Eugene A. Georger, James P. Wood, Albert G. Thorne, John Laughlin and Joseph H. Horton, of Buffalo; W. B. Rankine, C. B. Caskell and W. A. Philpott, Jr., of Niagara Falls.

Hall Signal Co.'s Gas-Motor for Semaphores.

The Hall Signal Company announces "a revolution in automatic semaphore signaling." A semaphore has been made at the shops of the company which is worked by carbonic-acid gas and controlled by electricity. With this device each signal is supplied with an independent source of power and at less cost than by any other means yet used. A cylinder, capable of withstanding a pressure of 600 lbs. to the sq. in., is set at the foot of the post of each signal and is charged with chemicals sufficient to generate gas, at the pressure named, in sufficient quantity to operate a semaphore arm, or two arms, several hundred times. A suitable reducing valve is used to provide a working pressure of 50 lbs. to the sq. in. Two tanks are set in the pit at the foot of each signal post, so that when the pressure from the one in service is nearly exhausted the connection is quickly changed to the reserve tank, while the exhausted pressure tank is taken away for refilling. The apparatus has been tested in the shop for several months and several of the signals have now been put into outdoor

service on important roads near New York. The movements of the signal are controlled by an electro-magnet as in other kinds of automatic signals. The company claims that the apparatus is absolutely frost proof and that it will prove to be the most economical semaphore signal ever made; that both in the matter of labor and material it will be cheaper to maintain than any other. Patents have been applied for.

A Ten-Mile Ditch to Be Dredged.

The Commissioners' Court of Delaware County, Ind., will let a contract, on Feb. 27, at Muncie, for digging a 10-mile ditch at an estimated cost of $15,964. The work includes removing two railroad bridges, but the estimate does not include stone work. Robert W. Monroe is County Auditor.

More Oil Fuel on the Houston & Texas Central.

Officers of the Houston & Texas Central are said to be so well satisfied with the recent tests of oil fuel on locomotives that they will at once equip 100 locomotives for oil burning, and also build numerous supply tanks. It is intended to burn oil on all of their locomotives. We are informed that suitable sites are now being selected at terminals and division points for storage tanks of 30,000 and 55,000 bbls. capacity each. Citizens of Sherman are considering the proposition of giving sufficient land to the Houston & Texas Central on account of the opposition against the road in Denison, and if this is done the division roundhouse and shops may come to Sherman. It is stated that the oil tanks will be located at Hempstead, Waco, Austin, Hearne, Dallas, Ennis and Fort Worth.

Railroad Shops in Little Rock.

The Baring Cross shops of the Missouri Pacific, in Little Rock, Ark., which, two years ago, were destroyed by fire, are being rebuilt and are to be finished by about April 1. The buildings burnt were wooden frame, but the new ones are more substantial. The work is in charge of E. Fisher, Engineer of Bridges and Buildings, and George H. Webb is Engineer in Charge. Work was begun last April. The buildings are briefly described as follows: locomotive erecting, boiler and machine shop, 135 x 529 ft. 5 in.; blacksmith shop, 90 x 221 ft. 5 in.; power house, 81 ft. 5 in. x 121 ft.; office, 50 x 150 ft., two stories and basement; coach manufacturing and repairing shop, 100 x 199 ft. 5 in., two stories; paint shop, 100 x 199 ft. 5 in.; planing mill, 80 x 201 ft. 5 in.; freight car repair shop, 70 x 300 ft.; paint storage room, 30 x 50 and 40 x 22 ft., T shape; oil house, 50 x 70 ft. There are two transfer tables, one 60 x 575 ft. and the other 70 x 245 ft. The brick smokestack is 154 ft. 5 in. high.

Surveys are being made for a site for new shops for the Choctaw, Oklahoma & Gulf in the North End of Little Rock, but nothing definite is known yet about the plans and specifications.

The Standard Steel Car Works.

Announcement of the selection of a site for the new Standard Steel Car Company was made on Monday. The new corporation has 250 acres of excellent land, between Beaver and Vanport, Pa., which will be located on a new railroad to connect the Pittsburgh & Lake Erie and the Cleveland & Pittsburgh lines in the form of a triangle. It is level land, well adapted to manufacturing purposes and convenient for shipping and receiving material. On this site the company will also build a new town, and at the outset will build 1,000 houses for workmen. The buildings for the plant will be started as soon as the weather is favorable. They will be of steel construction, arranged so that all departments can be enlarged without interfering with the working of the plant. The contract for the principal buildings has been awarded to the McClintic-Marshall Construction Company, of Pittsburgh. The cost of the new buildings is placed at $1,500,000. The contracts for the mechanical equipment of the plant have been let in preliminary form for some time. The plans and designs for this machinery were made under the direction of the President, J. M. Hansen. The new railroad to the site of the works will be built by the Standard Steel Car Company for its own use. It will provide independent communication with the main shipping points to the East and West, and will be operated as a terminal line. The new corporation is prepared to expend during the coming year over $2,500,000.

The Steam Engine Indicator in Locomotive Practice.

R. V. Wright, Mechanical Engineer of the Pittsburgh & Lake Erie Railroad, presented a paper on the above subject at the December meeting of the Railway Club of Pittsburgh. The paper is, in effect, an appeal for the more general use of the indicator in testing locomotives, and for care in the methods used. A long list of references to what the author considers the most important articles that have appeared, in recent years, in club proceedings and technical journals is given. The preliminary discussion brought out nothing very essential at the December meeting, and the discussion was continued at the January meeting. The list of references, as published in the December proceedings, will save time for anybody having occasion to refer to matters of the kind. It is well worth the while to obtain and file it among motive-power department references.

Big Generators for the Canadian Side at Niagara.

The General Electric Co. has received an order for three generators of 10,000 horse-power each to be used on the Canadian side of Niagara. The generators are for the Canadian Niagara Power Co., and their installation will mark the beginning of great developments on that side of the Falls. The powerhouse will be on the flat near the Dufferin Island. The generators will be about 18 ft. external diameter and run at 250 r. p. m., generating current at 12,000 volts and dispensing with transformers to run up from lower voltage. The generators are to deliver in current 98 per cent. of the shaft horse-power. This is the third large contract for generators at Niagara Falls which has been given to the General Electric Co. in the past year, including six of the earlier type 5,000-horse-power machines for the second American powerhouse and five 5,000 horse-power of a new type for the same plant.

Production of Pig Iron.

The American Iron and Steel Association has received complete statistics of the production of all kinds of pig iron in the United States in 1901. The total production of pig iron in 1901 was 15,878,354 gross tons, against 13,789,242 tons in 1900. 13,620,703 tons is 1899, 11,773,934 tons in 1898, and 9,652,680 tons in 1897. The increase in production in the first half of 1901 over the second half of 1900 was 1,527,940 tons, and the increase in production in the second half of 1901 over the first half of 1901 was 529,128 tons. The total increase in 1901 over 1900 was 2,089,112 tons. This is a larger increase than the boom year 1899 showed over the year 1898. The whole number of furnaces in blast on Dec. 31, 1901, was 266, against 232 on Dec. 31, 1900, and 259 on June 30, 1901.—*The Bulletin.*

A Large Dredge.

A contract has just been let by Mr. J. Poupore, a Montreal contractor, to the Polson Iron & Shipbuilding Works, at Toronto, who recently constructed the dredge "J. Israel Tarté" for the Dominion Government. The new dredge, which is to be finished by June 1 next, will be 96 ft. long, 36 ft. 8 in. beam, and a mean depth of 10 ft. 6 in. The main boom will be 66 ft. long, and two steel spuds will run down on each side of the vessel and take hold on the bottom while she is lifting. The dipper will work to a depth of 50 ft. and has a capacity of 8 cu. yds. The main hoisting engine has 16 x 18-in. cylinders. The contract price is $62,000. The dredge will be employed in the government construction works at Maisonneuve and Sorel, Quebec, for which Mr. Poupore has the contract; Mr. L. A. Desy, of Montreal, is the consulting engineer in its construction.

The North Pacific Coast Oil-Burning Locomotive.

J. B. Stetson and W. J. Thomas, President and Master Mechanic, respectively, of the North Pacific Coast Railroad, have built an oil-burning locomotive for that railroad. It has a straight boiler with a Morrison corrugated tube fire-box 16 ft. long, 41 in. in diam. and ⅜ in. thick, set low in the shell of the boiler. There is 7 in. between the ends of the Morrison tube and the boiler heads at each end, and the connections with the heads are made with necks 20 in. in diam. extending from the heads that close the fire-box ends. These necks are set low in the fire-box and 49 3-in. water-tubes are put through the fire-box heads and thus exposed to the flame within the fire-box. The dome is a long horizontal, cylindrical chamber connected to the boiler by four flanged joints, and the feed-water is said to enter the boiler through this steam chamber. The cab, cylinders and kindred parts are at the extreme front and the smoke-box and stack are at the rear. The gage of the road is 3 ft., the engine is a small 8-wheel passenger, and the working steam pressure is 140 lbs. per sq. in. The length of the boiler over all is 19 ft. 6 in. The Jones & Jover oil burner is used with a plain fire-wall to deflect the flame. The oil goes to the burners by way of the exhaust pipes and is thus heated before spraying it into the fire-box.

Schenectady Two-Cylinder Compounds on the New York Central.

The two-cylinder compound consolidation locomotives making up the large number built at the Schenectady Works for the New York Central, as described in design and performance in the *Railroad Gazette*, March 1 and April 26, 1901, are said to be much liked by both enginemen and officials. There are enough of these locomotives, and the work is hard enough, to make this feeling upon the part of those using the locomotives valuable, as an opinion formed after trial.

New Plant for the Southern Car & Foundry Co.

The Southern Car & Foundry Co. is preparing to begin work at once on building its new car works at Ensley, Ala., about 500 ft. west of the steel works of the Tennessee Coal, Iron & R. R. Co. The plans for the works were made by the Osborne Engineering Co., of Cleveland, Ohio, and in addition to the car shops, will include a malleable foundry. The buildings will be chiefly of brick and steel, and the plant will be the first in the South to make steel cars. The cost will be $600,000, and the daily capacity will be 20 cars. Material will be furnished by the Tennessee Coal, Iron & R. R. Co. A railroad is now being built to the site of the new plant by the Birmingham Southern R. R.

New Shops for the Pennsylvania.

We recently mentioned the fact that the Pennsylvania contemplated enlarging its shops at Columbus. It is now said that about $1,000,000 will be spent on improving the shops west of Pittsburgh, about $500,000 being spent at Columbus; and about $300,000 at the Allegheny shops. Among the improvements at Columbus will be a new coal wharf, an ash pit, an erecting shop and an addition to the present machinery shop, a new power station and an addition to the car paint shop. The erecting shop will be 80 x 60 and will be equipped with two 75-ton cranes; the addition to the machinery shop will be 61 ft. long. The new power station will replace the two power plants now in use; the roundhouse will have 52 stalls and a 75-ft. turn-table.

Consolidation of Brake Shoe Companies.

The American Brake Shoe & Foundry Company was incorporated in New Jersey on Jan. 29 with $3,000,000 capital stock. It has taken over the Sargent Company, of Chicago, and the Ramapo Foundry Co., of New Jersey. The Sargent Company is probably the largest company making brake-shoes. The Ramapo Foundry Co., while comparatively a new concern, is an off-shoot of the Ramapo Iron Works, having taken over the foundry business of the latter company in order to give that company more facilities for operating its switches and frog department. The officers of the American Brake Shoe & Foundry Company are: W. W. Snow, Chairman of the Board; W. D. Sargent, President; Otis D. Cutler, Vice-President and General Manager; H. K. Gilbert, Treasurer; E. J. Snow, Assistant Treasurer, and R. J. Davidson, Secretary. For the present the New York office will remain at 26 Cortlandt street.

Westinghouse Changes.

The retirement of B. H. Warren as Second Vice-President of the Westinghouse Electric & Manufacturing Co. has brought about the following changes in the organization: Frank H. Taylor, until recently Fourth Vice-President, has been advanced to Second Vice-President, and will be in charge of the sales of the company and have a general supervision over its affairs. L. A. Osborne, Manager of Works, has been made Fourth Vice-President, and will have charge of the engineering and producing operations. Arthur Hartwell has been advanced to Sales Manager, in charge of the sales organization. Mr. Hartwell has, until recently, been manager of the Chicago office. Philip A. Lange, until recently General Superintendent, has been made Manager of Works, and will have charge of the manufacturing departments. The organization in other respects remains as heretofore: George Westinghouse, President; Ph. Ferd. Kobbe, Third Vice-President and Treasurer, in charge of the financial department; G. W. Hebard and W. M. McFarland, Acting Vice-President; T. W. Siemon, Assistant Treasurer; A. M. Mattice, Chief Engineer; Charles F. Scott, Chief Electrician; B. G. Lamme, Assistant Chief Engineer; James C. Bennett, Auditor.

Safety Signals in the Erie Tunnel.

In the tunnel of the Erie Railroad, at Jersey City, where there was recently a derailment due to a fall of rock from the roof, the company is preparing to put in an electric wire, by which the watchmen can quickly communicate with the block signal stations at the ends of the tunnel. The plan is to run a wire along the wall of the tunnel, on each side, with buttons at intervals of 200 ft., by which the watchman can ring a bell in the signal cabin.

Monterey, Mexico, Plans $3,000,000 Water Works.

American contractors will soon be given an opportunity to bid for building a complete water works and sewer systems for the City of Monterey. The estimated cost is $3,000,000. The State and municipal governments have jointly determined to undertake this work, and the preliminary surveys for the systems have been approved.

The East Boston Tunnel.

The Boston Transit Commission is asking bids, until Feb. 25, for building Section C of the East Boston Tunnel under State street, from India street to near Atlantic avenue. A shield and some other portions of the plant will be furnished by the Commission. Plans can be seen and specifications and forms of contract can be obtained at 20 Beacon street, fifth floor. Howard A. Carson, Chief Engineer; B. Leighton Beal, Secretary.

Signaling Notes.

Various contracts for new automatic block signals are reported in another column.

The Boston & Maine has just put in use a large new interlocking plant at East Somerville, Mass.

The Michigan Railroad Commissioner has approved the interlocking signals at the crossings of the Michigan Central and Pere Marquette railroads at Lansing and North Lansing, and they have been put into service.

THE SCRAP HEAP.

Notes.

At Passaic, N. J., Jan. 30, a shed of the Paterson Electric Railway, with 50 summer cars, was destroyed by fire. The loss is variously stated at from $50,000 to $100,000.

According to Western newspapers the operating officers of the Burlington road were ordered, on Jan. 1, to begin treating freight cars of the Great Northern the same as though they were owned by the Burlington; but at the end of the month the order was rescinded.

The Railroad Commissioners of Texas have modified their order requiring passenger trains to be run on time, and requiring late trains to be bulletined; they will not forbid trains waiting for connections more than 30 minutes. All of the important roads showed that to neglect connecting trains which were more than half an hour late would often cause delays very annoying to passengers, and would seriously interrupt the regular movement of the United States mails.

The State Railroad Commissioners of Louisiana, act-

ing on a complaint of the New Orleans Board of Trade, has decided that 20 days is a reasonable length of free time to be allowed by the Louisiana Car Service [demurrage] Association on cars loaded with cottonseed. The demand of the Board of Trade was, presumably, for 40 days, or 80, or something like that. To the lay mind, 20 days would seem to be an unreasonably *long* time to keep a storehouse standing on wheels; but then, there is a good deal in the point of view.

The Pennsylvania Railroad has advanced the pay of a large number of train despatchers, telegraph operators and clerks. According to a Harrisburg newspaper, men receiving $65 and $70 a month will receive increases of $5 each. Certain train despatchers and clerks in superintendents' offices will be advanced $10. At 22 signal cabins on the Middle Division the working hours of the signalmen will be changed from 12 to 8, which means the promotion of 22 men. At one of the offices in Harrisburg new Standard typewriters will be introduced. In this connection it may be remarked that the makers of a certain typewriter, which has not been on the market many years, advertise that 700 machines of their make are used by the Pennsylvania Railroad.

Among other bills affecting railroads, introduced in the New York State Legislature lately, is one giving power to the Railroad Commissioners to prescribe freight rates; and there is one requiring the use of an automatic stopping apparatus on all locomotives or motors of trains running as fast as 30 miles an hour. The bill requires controlling devices to be placed "at selected points" along the railroad. The first named bill reads as follows:

That rates charged by common carriers for transportation of passengers or property and for all terminal services shall be just and reasonable, that there shall be no discrimination in freight rates or terminal charges between shippers; it prohibits any differential or greater rate for any service rendered in the transportation and delivery of property at the port of New York than is charged for the same service under like conditions by the same carrier, or under an agreement with other carriers, to any Atlantic port outside the State. It also provides for a hearing before the Board of Railroad Commissioners for violations of the law and confers upon the Board in such cases power to fix the rate for the future. It provides that the decisions and recommendations of the Board shall be complied with by the carrier, unless modified or set aside by the Supreme Court, upon the application of the carrier.

Traffic Notes.

The roads west of Chicago have a committee of traffic officers to see to the enforcement of the recent agreement forbidding secret rates. This committee is required to meet at least once a week. It is composed of the following: J. M. Johnson, Third Vice-President of the Rock Island; A. C. Bird, Third Vice-President of the St. Paul; H. R. McCullough, Third Vice-President of the North Western; Darius Miller, First Vice-President of the Burlington; Paul Morton, Second Vice-President of the Santa Fe, and S. M. Felton, President of the Alton. A tariff has been issued giving the rates on packing-house products eastward from Kansas City and other Missouri River points, which is signed by the general freight agents of 23 roads. The rates are about 10 per cent. less than those heretofore published. A press despatch says that the eastern lines refuse to accept their usual proportion of the new reduced rates, although the reduced proportions have been accepted by them all along, during the past year or more, when these selfsame reduced rates were being made without being published.

The Eastern Railway of Minnesota, which is a part of the Great Northern, now makes contracts with shippers by which the railroad company guarantees fire insurance on grain which is put into the company's steel elevators at Superior.

The passenger agent of the Southern Pacific, in the interior of New York State, tells reporters that travel to Southern California, most of which goes by way of New Orleans, is now so heavy that passengers have to delay their departure on account of the difficulty in getting sleeping car accommodations. Where a few years ago people would put up with tourist cars, or day cars, the demand now is for the highest class accommodations, on limited trains. A Chicago press despatch says that the Atchison talks of putting on another transcontinental train.

The inquiry into freight rates, which was begun by the Interstate Commerce Commission at Chicago a few weeks ago, was continued in Washington on Jan. 29. Testimony was given by Paul Morton, of the Atchison; J. M. Johnson, of the Rock Island, and J. A. Munroe, of the Union Pacific. According to the press reports the testimony was of the same frank character as that which was given at Chicago. For a long time the published rate on grain from Kansas City to Chicago was 12 cents, yet most of the shipments made by the large dealers were made at 7 cents or less, a considerable amount going at 6 cents.

The principal steamship lines carrying freight between this country and England have made an agreement to maintain rates on grain, flour and provisions. Grain will not be taken for less than 1½d. a bushel; flour, 7s. 6d. a ton; provisions, 10s. a ton. Rates have for several months been very low, and grain has been taken as low as 1½ cents. The rates on flour and provisions have also been severely cut, but not so far below the normal rate as in the case of grain. It is said that the rates now agreed on are low enough to warrant the expectation that they will be maintained. All of the regular English lines appear to be in the agreement, but none of the German lines are named.

News Notes on Wages and Discipline.

The Houston & Texas Central has adopted Brown's Discipline. Suspensions were done away with on Feb. 1.

The Norfolk & Western, after an extended conference with representatives of the telegraph operators employed by the company, has granted the operators an increase of pay, beginning Feb. 1.

A large number of men in the shops of the Pennsylvania lines at Fort Wayne, Ind., have received an advance in pay. It is said that the advance was not asked for, and that it amounts to 5 or 6 per cent.

An Ohio paper says that the Lake Shore & Michigan Southern has abandoned a rule of long standing by which track repair men were given the preference over other applicants for positions as firemen or freight brakemen.

Union Loop, Chicago.

A movement is on foot in Chicago by certain real estate interests to extend the present business district down town. Since the elevated loop was built, it has been considered as bounding the downtown business district. Recently plans were defeated in the City Council for putting up a number of high office buildings, exceeding the present allowable height for new buildings. The same interests which defeated these plans are now urging that the south side of the loop be moved from Van Buren street south to Polk street, and the question was brought before the Council last Monday. At the time of going to press it was not known what action was taken by the Council.

Checking Trainloads.

The London & North-Western Company now have a number of engines, and are building more, which can take 60 loaded coal wagons between certain points, and work these regularly. Estimating the weight per truck at eight tons and the tare at five tons, which is very low, the calculation is 780 tons per train. The loading of all trains is carefully watched by the district officers and district inspectors, and also by headquarters, so as to see what trains can be better loaded, or saved entirely. If it appears there is not always full loading, certain trains are made conditional instead of regular, so as to save running them whenever possible. On Saturday nights, again, the loading of many trains is increased, as they do not have to run so fast, only having to be at their destination on the Monday morning. As regards wagons, the London & North-Western Company are experimenting with some 20-ton wagons, and are going to build more so as to try to decrease the number of trucks to haul about. They work between specific points with traffic such as pig iron, sand, stone, etc. The company have made them higher than their ordinary trucks, but only a little longer, as the wheel base and length from buffer to buffer cannot be much increased, owing to the size of the turntables, hoists, etc., and the distances between the various lines and the amount of clearance of warehouses, bridges, etc., when being turned. For ordinary goods traffic the carrying capacity of the company's wagons—seven tons—is ample, as the average weight loaded in sheds, etc., is a good deal less, and the line has to carry so many mineral empties and other light traffic. The average loading per wagon and the light loads under certain weights are, however, most carefully watched at each station and for each district, first by the station agents and foremen, second by the district officers, and third by headquarters, a monthly comparison being made with previous months and corresponding months in previous years, so that any falling off is at once inquired into and remedied if possible, and one station is compared with another where the traffic is similar, and so on.—*Railway News.*

Power Plant for the St. Louis World's Fair.

A contract has been awarded to the Westinghouse Electric & Manufacturing Co. for machinery for the large power plant for the World's Fair, to be held in St. Louis in 1903. The plant will cost $1,000,000 and will generate 10,667 h.p.: the total horse power to be used by the fair being 25,000. The Citizens' Electric Light & Power Co. has contracted to furnish one-half of the total horsepower at a cost between $400,000 and $500,000. The amount of cash paid by the Exposition Company on the Westinghouse contract will be only $390,000, as that company will redeem the machinery after the fair is over. The contract let last week is for the plant complete and installed, including boilers, engines, foundations, piping, cooling towers, smoke consumers, mechanical draft and other apparatus. The boilers for the plant are to be located in a separate building 100 feet north of Machinery Hall, and will be connected with the boiler house by a tunnel.

Patents in 1901.

The Report of the Commissioner of Patents for the calendar year 1901, sent to Congress on Jan. 27, shows that 27,373 patents were issued during the year 1901, the number of applications being 46,449. During the year, 19,147 patents expired.

Rules for Making Meeting Points on the Alton.

The Chicago & Alton has issued a circular making the following additions to the rules governing the movement of trains by train orders:

"208-A: When a meeting point is made by train order between two or more trains at a telegraph station a copy of the order must be transmitted simultaneously to the operator at that station. The operator must keep the train order signal at stop until the order has been fulfilled, and will deliver a copy of the order to conductors and enginemen affected, who will respect it the same as if addressed to them.

"Meeting points must, whenever practicable, be made at telegraph stations. When practicable, orders must be placed at one or two telegraph stations in advance of station at which they are to be executed.

"220-B: When orders must be sent to the superior train at the meeting point, the operator must stop the superior train before reaching the switch to be used by the inferior train."

Earth Roads.

The U. S. Department of Agriculture has in press and will soon issue Farmers' Bulletin No. 136, entitled "Earth Roads." It was prepared by Maurice O. Eldridge, Assistant Director, Public Road Inquiries. Attention is called to various errors in laying out roads, especially the common error of endeavoring to secure routes covering the shortest distance between fixed points. For this purpose the road is often made to go over a hill instead of around it. A road halfway around a hill or through a valley is sometimes no longer than a road over a hill or through a valley. The difference in the length even between a straight road and one that is lightly curved is less than many suppose. The bulletin contains 20 illustrations. It is for free distribution, and copies will be sent to any address on application to Senators, Representatives and Delegates in Congress, or to the Secretary of Agriculture, Washington, D. C.

An Examination for Car Inspectors.

A committee from the Twin City Car Foremen and Inspectors' Association has formulated rules for the examination of applicants for positions as car inspectors, which will be presented to the roads represented in the Association. The principal requirements suggested are that the applicant be a graduate from the "repair track," where minor repairs are made at terminals; that he pass a physical examination; that he pass an examination in the common educational branches; that he pass an examination on air-brake construction and operation and that he show a thorough knowledge of the Master Car Builders' Rules of Interchange.

Freight Rates in Cuba.

The railroads of Cuba, the ownership of which is held mostly in England, have entered emphatic complaints against the reduction in rates for the transportation of sugar and tobacco, which was recently ordered by the Military Governor of the Island. It is claimed that the tariffs heretofore in force were virtually a part of the contract between the railroads and the Spanish Government, and therefore that the order to change these tariffs is a violation of the treaty between the United States and Spain. It appears that the new rates specified by the governor are not so very objectionable, but that a clause in the regulations requires that rates heretofore lower than the new tariffs must be continued as they were; and it is discovered that there were many special low rates for large shippers. The new rates are made on the basis of about 4.6 cents per ton per kilometer, for distances up to 25 kilometers, and half that rate for distances between 25 and 50 kilometers.

Mono-Rail Between Edinburgh and Glasgow.

Plans have been submitted for the approval of the Board of Trade for a mono-rail line between Edinburgh and Glasgow. The speed on the line is to be 117 miles an hour, meaning that the journey of 49 miles would be covered in about 25 minutes.

Metropolitan (London Underground) Progressive.

At the half-yearly meeting of the shareholders of the Metropolitan (Underground) Railway the report showed a profit of £200,000. It stated that arrangements were progressing for the installation of electricity and the equipment of the District and Metropolitan. The chairman of the Metropolitan had proposed a joint power house, but the District company had decided to erect an enormous one itself. The Metropolitan Company would build a power house at Kingsbury-Neasden within a year and a half.

Baldwin Passenger Engines for the P. L. M., of France.

These engines are not yet in regular service on the main line on the express trains from Paris to the Riviera and inquiries fail to discover when they will go into regular running, though the time now must be not far distant as they have been running since the beginning of November.

Department of Commerce and Labor.

The bill establishing the Department of Commerce and Labor passed by the United States Senate, on Jan. 27, and noted in this column last week, provides for the transfer to the new department of the Lighthouse Board, the Life Saving Service, the Marine Hospital Service, the Steamboat Inspection Service, the Bureau of Navigation, the Bureau of Immigration, the Bureau of Foreign Commerce, the Bureau of Statistics, the Department of Labor, the Fish Commission, and the Census Office. The bill provides that the new department shall be of cabinet rank with a Secretary of Commerce and Labor to be a member of the Cabinet, an Assistant Secretary of Commerce and Labor, a chief of the Bureau of Manufactures and an office force of 27 assistants and clerks. The bureaus transferred have an aggregate force of about 300, exclusive of the Census office, which has been reduced from 2,700 to about half that number, and will be still further reduced. It is expected that if the bill passes the House of Representatives the new department will exercise a broad supervision over all the public activities which directly or indirectly aid the business, manufacturing and wage-earning classes in the United States.

The Carnegie Institution at Washington.

The first meeting of the Board of Trustees of the Carnegie Institution was held in Washington on Jan. 29 and 30. Mr. Carnegie was present and made a brief address to the Board and the formal deed of his gift of $10,000,000 was read and the gift formally accepted. Mr. William E. Dodge, of New York, was selected as a member of the Board in place of Ex-President Cleveland, who is unable to serve. Dr. Daniel C. Gilman, Ex-President of Johns Hopkins University, was elected President of the Institution. The permanent officers of the Board of Trustees are: Mr. Abram S. Hewitt, of New York, Chairman; Dr. J. S. Billings, of New York, Vice-Chairman; Prof. Charles D. Walcott, of Washington, Secretary. The Executive Committee elected by the Board is as follows: Mr. A. S. Hewitt, Dr. D. C. Gilman, Hon. Elihu Root, Dr. J. S. Billings, Dr. S. Wier Mitchell, Prof. C. D. Walcott, Mr. Carroll D. Wright. The temporary headquarters of the Carnegie Institution are at 1439 K street N. W.

Pennsylvania Railroad Pensions.

The pension department of the Pennsylvania Railroad reports that in the 12 months ending Dec. 31, 1901, allowances aggregating $292,290.20 were authorized to be paid to retired employees, and this sum, added to the allowances paid during 1900, makes up a grand total of $536,310.17 for the two years. The annual appropriation is $300,000. Since the founding of the department 1,574 employees have been retired and granted allowances, and 217 of these have died. Of the total number retired 248 were of the 65 year to 70 year class. Of those so relieved from active duty the requests originating with the employees were four to every one emanating from the employing officer.

LOCOMOTIVE BUILDING.

The Mexican Southern is having a locomotive built at the Cooke Works.

The Buffalo, Rochester & Pittsburgh is having 10 locomotives built at the Brooks Works.

The Northern Pacific is having 18 locomotives built at the Richmond Locomotive Works, instead of 10, as reported Jan. 31.

The Norfolk & Western has ordered 15 locomotives from the Baldwin Works and 15 from the American Locomotive Co.

The Texas & Pacific has ordered from the Cooke Works of the American Locomotive Co. three passenger, 25 freight and seven switch engines; delivery during next six months.

CAR BUILDING.

The Copper Range is having 75 freights built at Chicago.

The Pittsburgh Plate Glass Co. is having 10 freights built at Allegheny.

The Colorado & Southern has ordered one cafe car from the Pullman Co.

Bailey & Cole are having four freight cars built at the Barney & Smith works.

The American Sheet Steel Co. is having four freight cars built at Allegheny.

The Seaboard Air Line has ordered 10 coaches from the Niles Car & Mfg. Co.

The St. Louis Valley is having 270 freights built at Madison and 40 at Mt. Vernon.

The Chicago, Indianapolis & Louisville is having 250 freights built by Haskell & Barker.

The Missouri Pacific has ordered 680 freights from the American Car & Foundry Co.

The Georgia Southern & Florida has ordered from the Georgia Car & Mfg. Co. 200 box cars.

The Norfolk & Western has ordered 700 freight cars from the Southern Car & Foundry Co.

The Southern Pacific has ordered 1,600 box and 1,000 flat cars from the American Car & Foundry Co.

The Barrett Mfg. Co., of Chicago, has ordered 20 tank cars from the Illinois Car & Equipment Co.

The Pittsburgh & Lake Erie is having 500 freights built at Detroit, and 500 at the Jeffersonville works.

The Wabash has ordered 500 box cars from the American Car & Foundry Co., in addition to orders previously reported.

The Mexican National has ordered from the Georgia Car & Mfg. Co. 700 box, 200 flat, 150 gondola and 150 stock cars.

The Denver & Rio Grande has ordered 500 coal cars from the American Car & Foundry Co., besides the order reported last November.

The Cincinnati, New Orleans & Texas Pacific is having 1,000 freights built at the Lenoir City works of the Southern Car & Foundry Co., and 800 at the Memphis works.

The New York Central & Hudson River has ordered 1,000 box cars of 80,000 lbs. capacity from the Illinois Car & Equipment Co., and also 1,000 from the Pullman Company.

The Coahuila & Pacific has ordered two first class coaches, two second class coaches, and two combination second class baggage and mail cars, from the American Car & Foundry Co.

The Grand Rapids & Indiana order with the Rodger Ballast Car Co., reported in our issue of the 24th, calls for 50 40-ton convertible ballast, flat-bottom gondola cars 34 ft. long, May delivery.

The Algoma Central & Hudson Bay order, reported in our issue of Jan. 17, should read 50 box and 300 flat cars to be built at the company's shops at Sault Ste. Marie, May delivery. The specifications include the following particulars: Cars to be built of wood, 80,000 lbs. capacity, Bettendorf bolsters, Kewanee brake-beams, Westinghouse air-brakes, St. Louis Car Co. brasses, Chicago couplers, Security doors, Miner draft rigging, Ryan dust guards, McCord journal boxes and lids, and French springs. The box cars will have Chicago-Cleveland roofs.

BRIDGE BUILDING.

AKRON, OHIO.—Bonds have been sold for the proposed Falor street bridge. It has not been decided if the bridge shall be built at Falor street or at Wooster avenue, but as soon as the committee decides on this matter, bids will be wanted.

AMHERST, MASS.—The Amherst & Sutherland Ry. will build a bridge across the river at Mill Valley.

ARKANSAS.—The House of Representatives, on Feb. 1, passed the bill previously passed by the United States Senate, authorizing the Southern Missouri & Arkansas R. R. Co. to build and maintain a bridge across the Current River in Arkansas. (Jan. 17, page 47.)

ATTICA, IND.—The Board of Commissioners of Warren County, has ordered that bids be advertised for the building of a steel and stone bridge over Little Pine creek, in Warren township. It will be about 450 ft. long.

AVON, ILL.—Bids are wanted, until Feb. 11, by A. L. Wingate, at Avon, or by Thomas S. McLachlan, City Engineer, Monmouth, Ill., for a steel bridge over a dry hollow. The total length will be 185 ft. Estimated cost, $24,000.

BEDFORD, IND.—See Crawfordsville, Ind.

BENWOOD, W. VA.—An ordinance to permit the Bellaire & Benwood Bridge Co. to build a bridge over the Ohio is now before the City Councils of Bellaire and Benwood. As soon as these ordinances are passed, we are told, the company expects to be able to let the contracts. G. W. Yost, Bellaire, Ohio, is Secretary.

BOSTON, KY.—Bids are wanted at once by the Fiscal Court of Nelson County (Bardstown) for a steel bridge over Rolling Fork River, near Boston. The estimated cost is less than $8,000.

BUFFALO, N. Y.—A bill has been introduced in the United States House of Representatives to extend the time for finishing the proposed bridge over the Niagara River, to June 30, 1905. Work must be begun within one year of the passing of the present bill.

CANTON, OHIO.—The County Commissioners, according to report, have in contemplation considerable bridge repair work; it will involve quite an amount of steel.

CHICAGO, ILL.—Bids are wanted at noon Feb. 27, for building the abutments and piers for four aqueduct bridges on the west section of the Illinois & Mississippi Canal. Address the U. S. Engineer Office, 1637 Indiana avenue, Chicago, Ill.

CHILLICOTHE, OHIO.—Bids are wanted, Feb. 8, for a steel hoist bridge at Main street. Robert D. Alexander, City Clerk.

CINCINNATI, OHIO.—Bids are wanted, until noon of Feb. 24, for building the superstructure for the bridge over Mill Creek, at Spring Grove avenue. It will consist of single-span deck bridge, with three arch trusses. 128 ft. ¼ in. center to center of end pins, with rise of 14 ft. 3 in. at center of span. Length will be 137 ft. 4 in., end to end of floor for roadway, 40 ft. between curbs, with asphalt pavement on buckle plates, and sidewalks on each side 10 ft. wide, with cement pavement on buckle plates. Bridge will have skew of 22 deg. and 50 minutes. Robert Allison, President of the Board of Public Service.

Bids are wanted by the Board of Public Service, until noon of Feb. 24, for a superstructure of the St. Clair street bridge from Euclid avenue to Eden avenue. The work will consist of three steel deck spans of seventy-five (75) ft. each, supported on steel columns, and braced extensions for trusses, making a total length of three hundred and forty-eight (348) ft. Roadway will be seventeen (17) ft., with sidewalks six and one-half (6½) ft. on each side of roadway, making total width thirty (30) ft.

CLIFTON, WIS.—The town contemplates building a steel bridge in the spring. Address Henry Frohwader, at this place.

COLUMBIA, KY.—James Garnett, Jr., County Attorney, would like to hear from bridge builders regarding two bridges proposed over Russell Creek to be about 140 ft. and 100 ft., respectively, and probably be built next spring.

CONNEAUT, OHIO.—The time limit of the franchise granted to C. W. Smith and George A. Hardway for a viaduct about 1,800 ft. long over the valley and Conneaut Creek, expired on Dec. 17. A. M. Becker, of the American Bridge Co., has been granted a similar franchise, which stipulates that work must be begun within 100 days of the passage of the franchise.

COTTONWOOD FALLS, KAN.—Bids are wanted Feb. 20, for two iron or steel bridges, both to be over South Fork. W. A. Wardell, County Clerk.

CRAWFORDSVILLE, IND.—W. A. Wallace, Assistant Engineer of the Chicago, Indianapolis & Louisville Ry., 198 Custom House Place, Chicago, will receive bids with plans and specifications, until March 1, for building a through span steel bridge 134 ft. long over Sugar Creek at Crawfordsville; also for a bridge 117 ft. long over Beaublossom Creek at Gosport, to consist of two deck girders; also for a steel bridge 122 ft. long over Leatherwood Creek at Bedford, to consist of deck span.

DARTMOUTH, MASS.—An issue of $30,000 of bridge bonds has been sold for the proposed bridge over Apponegansett River.

DAVID CITY, NEB.—Bids are wanted, until Feb. 18, for doing all the bridge work this year in Butler County. M. J. Bouse, County Clerk.

DAVENPORT, IOWA.—It is said bids will be wanted soon for a bridge at Warren street.

EASTON, PA.—The Lehigh & New England will build a new bridge over the Delaware River at Sands Eddy, five miles from here, to connect with the Pennsylvania Railroad.

ELIZABETHTON, TENN.—In our issue of Jan. 17 we stated that the County Court of Carter County would soon build some bridges. We are now told that bids will be wanted for these structures from March 22, until April 1, by the Carter County Bridge Committee, of which J. E. Boren is Chairman and W. R. Allen, Secretary. The bridges will be of the following lengths: 300 ft., over Dol River; 120 ft., over Watanga River, and also one of 100 ft., over the latter river.

GALVESTON, TEXAS.—The Gulf, Colorado & Santa Fe proposes to spend about $300,000 this year for several new steel bridges to replace wooden structures.

GOSPORT, IND.—See Crawfordsville, Ind.

GRAND RAPIDS, MICH.—We are told that there is talk of issuing bonds to the amount of $85,000 for building the proposed bridge over Grand River at Wealthy avenue. The bridge will be about 700 ft. long. L. W. Anderson, City Engineer.

GREENWICH, CONN.—The town officers have under consideration the matter of building a suitable bridge over Mianus River at Mianus. A steel bridge is estimated to cost $14,000, and a stone bridge from $21,000 to $23,000. These figures are based upon a structure 150 ft. long and 40 ft. wide.

HALIFAX, N. S.—The Provincial Government is receiving bids for a bridge across the Sable River, in Shelburne County. Particulars from Arthur Drysdale, Commissioner of Public Works.

HAMMOND, IND.—The New York, Chicago & St. Louis will soon be ready to award the contract for its proposed 200-ft. steel bridge over Calumet River at Hammond.

HARLAN, KAN.—Bids are wanted, Feb. 17, by John A. Crabb, County Clerk, Smith Center, Kan., for a steel bridge over Solomon River.

HARRISBURG, PA.—Bids are wanted, until noon of Feb. 8, for furnishing the material for building a steel deck bridge to cross the subway on Market street. Address George B. Stucker, Highway Commissioner. Separate bids are wanted for other work in connection with this bridge.

HEGEWISCH, ILL.—The New York, Chicago & St. Louis has let the contract to the King Bridge Co., of Cleveland, for the bridge over Calumet River, at this place. It is to be a truss, 225 ft. long.

KINGSTON, N. Y.—The West Shore R. R. has given a contract to the American Bridge Co. for a new viaduct to replace the present structure over Rondout Creek, to be finished in about a year and cost $275,000. It will be 1,228 ft. long and 155 ft. high.

LAFAYETTE, IND.—Bids will be received at the Auditor's office, until 10 a.m., March 4, for repairing the superstructure and substructure for the bridge over the Wabash River at Brown street, in Lafayette. Appropriation $31,000. George A. Jamison, Auditor.

LEXINGTON, KY.—Bids for the bridge over the Cincinnati Southern, recently received by the Lexington & Georgetown Traction Co., have been rejected. It is said new bids will be wanted at the Cincinnati office for a bridge 105 ft. long and 25 ft. wide.

MCMINNVILLE, TENN.—The Warren County Bridge Committee wants bids on a steel bridge over Hickory Creek. Estimated cost $4,000. J. I. Finney, Clerk.

MAINVILLE, PA.—The Philadelphia & Reading has let the contract to the Phoenix Bridge Co. for a single-track steel viaduct on the Catawissa branch at Mainville. The present bridge is a wooden deck "Foreman" truss of four spans, having a total length of 724 ft., about 105 ft. high. This is the last wooden bridge on this branch to be replaced with steel.

We are told that another bridge is contemplated in this vicinity, to cross Catawissa Creek, and that it will be a highway structure. The County Commissioner of Columbia County may be addressed.

MILWAUKEE, WIS.—City Engineer Charles Poetsch has submitted an estimate of the cost of the proposed Humboldt avenue viaduct, which will extend from North avenue to Humboldt street. The cost exclusive of damages will be about $300,000. The viaduct will be 2,036 ft. long, the roadway will be 70 ft. wide, and there will be two sidewalks 10 ft. each.

MINNEAPOLIS, MINN.—The Wisconsin Central is reported considering building another bridge to connect Boom and Nicolet Islands.

MITCHELL, S. DAK.—Bids are wanted, until Feb. 18, for building three bridges, one of which is a steel bridge 100 ft. long. H. B. Anderson, County Auditor.

MONTREAL, CAN.—In another column we mention the project for the third bridge over the St. Lawrence River. The work will be carried on by the Atlas Construction Co., recently incorporated for that purpose.

The South Shore Ry. will let the contract in a few days for the steel bridge over the Becancourt River; it will be 130 ft. long. The company is having plans made for other bridges on the road between Sorel and Levis, for which contracts are yet to be let.

NEBRASKA CITY, NEB.—Bids are wanted until Feb. 19, for building a number of bridges in the county. Address H. R. Young, County Clerk, or A. M. Munn, Engineer.

NEW CASTLE, PA.—The Select Council has passed an ordinance providing for a big viaduct over the Shenango River from Moravia street to Mahoning avenue. The viaduct will be nearly one-quarter of a mile long and 40 ft. wide. It will cross the tracks of the P. & W., P. & L. E. R. R., Erie R. R. and B. R. & P. R. R. The estimated cost is $75,000 and the expense will be paid by the various railroads and the city and county. The chief engineer of the P. & L. E. may be able to give further details.

NEWMAN, GA.—Bids are wanted until Feb. 17, 11 a. m., for the steel bridge over Mountain Creek. The bridge to consist of one steel span 80 ft. long, with 12 ft. roadway, and to be placed on piers constructed by the county; or for rebuilding a 40 ft. steel span, with 12 ft. roadway, that recently washed down, and putting in a new 40 ft. steel span similar to one to be rebuilt. Also, to build one (center) set cylinder piers for said bridge, end piers to be built by the county. W. L. Stallings, Clerk, Newman, Ga.

OAKDALE, WIS.—Fred. Gabower, at this place, will receive bids some time in the spring for a bridge over Bear Creek.

OAKLAND, CAL.—The matter of opening Commerce street by building a bridge to Fourteenth street is under consideration by the City Council. The bridge is estimated to cost about $15,000.

PEMBROKE, ONT.—It is proposed to build a steel bridge connecting Allumette Island with this town. J. W. Munro states that such a bridge could be built for $500,000.

PERTH AMBOY, N. J.—The New York & Long Branch R. R. is reported making repairs to its draw bridge over the Raritan River between Perth Amboy and South Amboy. This bridge has been in use for 25 years, and for the past two years it was frequently reported that a new bridge was contemplated.

PITTSBURGH, PA.—The Pittsburgh & Lake Erie will replace all small bridges on the road between Pittsburgh and Youngstown with stone or concrete structures; using the arch form of construction where practicable, and the steel-concrete floor construction in other cases. Stone arch culverts of 50 to 70 ft. span will be used in some instances to replace a series of steel spans over large openings.

PORTAGE, N. Y.—The Erie R. R. will replace the steel bridge across the Genesee River at Portage, in Wyoming County.

PROVIDENCE, R. I.—The Chatlett street bridge project is now under consideration by the Commissioner of Public Works, who states that it is a necessity and should be built at once. The bridge is to cross the Woonasquatucket River.

RACINE, WIS.—The City Council is considering repairing the Main and State street bridges.

RALSTON, OKLA. T.—The contract for the three bridges over the Arkansas River for the county has been awarded to the Oklahoma Bridge & Steel Structural Works Co. at $25,000.

ROCHESTER, N. Y.—The Superintendent of the Canal Board (Albany) is reported to have approved plans for the new bridge at Plymouth avenue, and it is said bids will be wanted soon. It will be a riveted girder lift-bridge costing $50,000.

RUTLAND, VT.—The Rutland R. R. is reported ready to receive bids for steel bridges previously mentioned.

ST. LOUIS, MO.—A viaduct is proposed over the St. Louis & San Francisco tracks.

ST. PAUL, MINN.—G. S. Edmonstone, City Bridge Engineer, is making plans and specifications for the viaduct on Third street which will be about 1,000 ft. long and built of plate girders. It is probable that bids will be wanted in the near future.

SAN JOSE, CAL.—Bids are wanted, until 10 a.m., Feb. 17, for a combination "A" bridge over Stevens Creek. Plans are with the Board of Supervisors. Henry A. Pfister, Clerk.

SANTA MONICA, CAL.—The $25,000 bridge bonds will be sold on Feb. 17, and it is probable that the bids for the Ocean avenue bridge will be wanted soon after.

SPARTA, WIS.—The county has two bridges in contemplation. Address S. M. Steele, at Valley Junction, Wis.

SPIRIT LAKE, IOWA.—The Board of Supervisors of Dickenson County want bids, April 8, for building three iron bridges, one to be 60 ft. long and two each to be about 100 ft. Samuel L. Pillsbury, County Auditor.

SPOKANE, WASH.—A bridge is proposed at Sixth avenue at a cost of about $80,000.

WATERLOO, IOWA.—The Board of Supervisors of Black Hawk County want bids, until noon of Feb. 25, for building a steel highway bridge across Cedar River on Fourth street. The bridge will be 566 ft. 2 in. long and 36 ft. clear roadway, with two sidewalks 9 ft. wide each. The bridge will consist of seven spans on six rock or concrete piers and to rock abutments. Bids will also be received at the same time and under the same regulations for a concrete or concrete-steel arch bridge for the same site, having the same number of spans, with 36 ft. roadway and two sidewalks each 8 ft. in the clear, or total width of 52 ft. inside of the hand railing; proposals to be accompanied with complete plans and specifications. Bids will also be received at the same time for taking down the old five-span bow-string bridge, now standing on the site of the proposed new bridge, and removing three spans to a place about two miles up the river and erecting them across Cedar River from Cedar River Park to Sans Souci. The remaining two spans are to be rebuilt across Black Hawk Creek on the Waterloo & Cedar Falls road, or extension of Commercial street. Plans and specifications have been made for all this work. Address Charles D. Becker, Chairman of Supervisors. M. L. Newton is City Engineer.

J. R. Vaughan, Secretary, General Committee, writes us that bids will be wanted, about Feb. 12, for a plate girder or Melan arch bridge over Cedar River on Bridge street, about 540 ft. long, to cost about $50,000.

WEST BEND, IOWA.—Bids are wanted, Feb. 10, for a

steel bridge over Prairie Creek by O. V. Hand, County Auditor, Emmetsburg.

WILKESBARRE, PA.—The bridges across Towanda Creek at Masontown and Rockwell were washed away by the flood in December. The State has been asked to rebuild them.

WILLIAMSPORT, IND.—Bids are wanted, Feb. 24, by the Auditor of Warren County for a steel viaduct on Independence and Green Hill Road.

WILLIAMSPORT, IND.—Bids are wanted, Feb. 14, by the County Commission, E. V. Lovingood, Chairman, for a steel bridge 450 ft. long.

Other Structures.

AUBURN, N. Y.—The New York Central & Hudson River proposes to build a new passenger station in this city.

BALTIMORE, MD.—The U. S. Treasury Department on Jan. 28 let the contract for building the new U. S. Custom House at Baltimore, designed by Hornblower & Marshall, of Washington, to Henry Smith & Sons, of Baltimore, at their bid of $792,992, which was the lowest of three bids received.

BRIDGEPORT, CONN.—Holbrook, Cabot & Daly, of Boston, has a contract from the New York, New Haven & Hartford for improved terminal facilities in Bridgeport, involving an expenditure of between $700,000 and $800,000. This includes the new railroad station.

BRISTOL, PA.—The Pennsylvania Railroad is having plans made for a new freight and passenger station at Bristol.

CARNEGIE, PA.—The Columbia Bridge Company, as already mentioned, will enlarge its plant. It has secured 27 acres of ground adjoining its present site in East Carnegie, on which extensive additions to its plant will be built. Recently the Pittsburgh Steel & Shafting Company, of Braddock, interests were bought by the bridge company, and the plants of the two companies will be combined. Plans for the new plant have been prepared by Henry M. Stanyon. They include an open-hearth furnace, blooming mill, bar mill, and a structural and shafting plant. The works have been economically arranged, so that the handling of the material from one department to another can be accomplished with as little labor as possible. The improvements will cost about one million dollars.

CLEVELAND, OHIO.—See Erie under "Railroad Construction."

CLEVELAND, OHIO.—Plans are being made by Pickands, Mather & Co., of this city for a large blast furnace in Ohio. The site has not yet been selected, and no date has as yet been fixed for the work of construction to begin, but these announcements may be expected within a short time. The product of the furnace will be malleable pig and foundry iron.

COLUMBIA, PA.—The stockholders of the Susquehanna Iron & Steel Co. have authorized an issue of $300,000 bonds, the proceeds to be used to build a pipe mill and make general improvements.

DETROIT, MICH.—The Michigan Malleable Iron Works will increase its capacity this spring by building several additional buildings.

DULUTH, MINN.—The Eastern Minnesota-Great Northern interest is to increase its new ore dock on Allouez Bay, Superior, 6,000 feet, adding 100 pockets, representing 30,000 gross tons, and giving the entire dock a storage capacity of 100,000 gross tons.

JEANESVILLE, PA.—The Jeanesville Iron Works Co. contemplates the following improvements: Increase of about 50 per cent. of the present area of both foundry and machine shop; a new core oven, cupola and traveling crane in foundry; a traveling crane in casting shed; a complete new building for blacksmith shop, also a complete new building for pattern shop. The machine shop will be equipped with several new tools.

KALAMAZOO, MICH.—Plans for a new Clarage foundry have been prepared, and the contracts for the buildings will be let shortly. The main building, which will contain the molding floor and core room, will be 70x150 ft., while a one-story building 50x60 ft. will be used as a storehouse for patterns. A building 50x100 ft. and two stories high, already erected, will be fitted up for a machine shop and cleaning department.

MEMPHIS, TENN.—Extensive improvements are proposed to the union station.

NORWALK, OHIO.—The Wheeling & Lake Erie has decided to make the shop extension which has long been contemplated. The machine shop will be extended 250 ft. and about $100,000 of machinery added.

PERU, IND.—It is reported that the Peru Steel Casting Co. will double the capacity of its plant by the installation of a large amount of machinery and by enlarging its foundry.

PORTLAND, ME.—A site is reported decided upon for the new station for the Grand Trunk Ry.

QUAKERTOWN, PA.—The Reading Railroad contemplates some improvements at Quakertown, on the Bethlehem branch, and bids have been invited for a new passenger station and a larger freight station. The passenger station will be a stone structure, 25 ft. wide and 97 ft. long. The freighthouse will be a one-story structure, 30 ft. wide by 128 ft. long, covered with a slag roof. An office will be located at one end. The building will be lighted by electricity. The bids for both structures are due Feb. 7.

RAVENNA, OHIO.—Plans have been made, according to report, for shops on the Cleveland & Pittsburgh at Ravenna, at the junction of the Youngstown branch.

RENOVO, PA.—The Pennsylvania will extend the shops at Renovo, but the expenditure will not reach $100,000, as reported.

ST. LOUIS, MO.—Articles of incorporation were filed, on Jan. 31, by the South St. Louis Foundry, organized to do general foundry business. The capital stock is $100,000. The shareholders are: Robert J. Kilpatrick, Joseph N. Kilpatrick, Fred M. Kilpatrick, Charles P. Kilpatrick, Edwin Kilpatrick.

SAULT STE. MARIE, ONTARIO.—H. J. Waddle, General Superintendent of the Algoma Tube Company, is now in the United States in reference to the structural material and equipment contracts for the new works, which, it is said, will represent an outlay of nearly $10,000,000. Plans for the plant are being made by S. B. Huber & Co., of Pittsburgh, which city Mr. Waddle, according to last advices, is visiting.

TACOMA, WASH.—The Tacoma Company was incorporated, Jan. 30, with $25,000,000 capital and will build blast furnaces and a large steel plant in Tacoma. The company is authorized to do a general mining, smelting, lumbering, and merchandise business. United States Senator A. G. Foster will be President, though not an incorporator. The incorporators are: Henry Hewitt, A. M. Ingersoll, Charles W. Thompson, A. J. Hayward, and J. B. McIntire. Large deposits of ore and a large area of coal lands have been secured. Senator Foster is a heavy stockholder in the Pacific Steel Co., now operating a blast furnace at Irondale. It is expected that this company will be absorbed by the new company.

TRENTON, N. J.—The shops of the American Bridge Co. in Trenton will be enlarged.

YOUNGSTOWN, OHIO.—In addition to other improvements, the Republic Iron & Steel Co. will dismantle the Bessemer plant at Youngstown, which has a capacity of 600 tons daily, and replace it with one of 1,200 tons a day. The converters are to be replaced by 10-ton converters.

WILKESBARRE, PA.—The Central Railroad of New Jersey will build a new station in this city.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xviii.)

Western Society of Engineers.

At a meeting of the Western Society of Engineers, Wednesday evening, Feb. 5, Mr. J. W. Alvord presented a paper on "Sewage Purification Plants," which was illustrated by lantern slides.

American Society of Civil Engineers.

On Wednesday, Feb. 5, a paper by Ernest P. Goodrich, Jun. Am. Soc. C. E., entitled, "The Supporting Power of Piles," was presented for discussion. This paper was printed in the December number of *Proceedings.*

Western Railway Club.

The Western Railway Club has issued a circular that revision of the Rules of Interchange will be reported on and discussed at the March meeting. The committee to consider this subject consists of: J. J. Hennessey, Chairman; R. D. Smith, P. H. Peck, C. M. Mileham and T. B. Hunt. Those having changes to suggest are asked to send them to the chairman of the committee, Mr. Hennessey, West Milwaukee, Wis.

Car Foremen's Association of Chicago.

The regular meeting of the Car Foremen's Association of Chicago will be held in Room 209 Masonic Temple, Wednesday evening, Feb. 12, at 8 o'clock. The following programme has been arranged:

Discussion of report of Committee on Condition of Draft Rigging in Cars and Suggestions for Improvement; a disputed case in car interchange; discussion of M. C. B. Rules 1, 2 and 3; and a report of the committee appointed to formulate a list of questions for the examination of candidates for the position of car inspector.

The Iowa Railroad Club.

A dozen railroad officers of Iowa met at Des Moines last week for the purpose of organizing a railroad club, and their action resulted in an organization with the above name. There were present Superintendent C. M. Levy, of the Iowa lines of the Burlington; H. V. Nutt, Assistant; G. W. Fabens, of the Ottumwa Division; M. W. Robinson, Trainmaster, Ottumwa; W. J. Calvil, Roadmaster of the Burlington; W. D. Hodge, Superintendent of the Northern Division of the Chicago & Northwestern; C. B. Chevenall, Assistant; A. P. Tanner, General Superintendent of the Minneapolis & St. Louis; C. W. Huntington, General Superintendent of the Iowa Central; G. A. Goodrell, Superintendent of the Burlington, Cedar Rapids & Northern; H. B. Earling, Superintendent of the Chicago, Milwaukee & St. Paul; W. J. Lawrence, Superintendent of the Chicago, Rock Island & Pacific, and H. P. Greenough, Superintendent of the Rock Island & Peoria. Mr. H. J. Slifer, Superintendent of the Chicago & North Western, at Boone, was elected President; G. A. Goodrell, Cedar Rapids, Vice-President; C. M. Levy, Second Vice-President; W. J. Lawrence, Third Vice-President; and C. W. Huntington, Fourth Vice-President; P. M. Plumb, Master Mechanic of the Chicago, Milwaukee & St. Paul, at Marion, was chosen Secretary; and C. P. Stemble, of the Chicago Great Western, Treasurer. The object of the club is "the promotion of railroad business." Adjournment was taken until April 1.

The Engineers' Club of Philadelphia.

A business meeting of the Club was held on Saturday, Feb. 1, at 8 o'clock p.m. The paper was on "The Improvement of the Channels of the Delaware and Schuylkill Rivers by the City of Philadelphia." Illustrated. By C. H. Ott.

The twenty-third annual meeting of the Club, held on Jan. 18, was called to order by Vice-President L. Y. Schermerhorn, at 8:20 p.m. There were 73 members and visitors present. The annual reports of the Board of Directors and of the Treasurer were presented and discussed.

Mr. Carl Hering presented a preamble and two resolutions, and accepted an amended form, offered by Prof. L. F. Rondinella, containing three preambles and a resolution, setting forth the advantages of the metric system as the standard for the United States, and urging the Philadelphia members of Congress to advocate its adoption within a reasonable time. The subject was fully discussed by Messrs. A. Falkenau, S. G. Comfort, Walter L. Webb, George M. Sinclair, Francis Schumann, L. F. Rondinella, and Wm. Copeland Furber, and, upon motion, the preambles and resolutions were laid upon the table.

In the absence of Dr. Henry Leffmann, retiring President, his address on the subject of "Ancient Metallurgy," was read by the Secretary. The paper consisted of an historical sketch of the development of metallurgical methods from those described in a work by Theophrastus, about 300 B. C., to the beginning of the modern science.

The Tellers reported 252 legal ballots cast at the election held on this date, and the number of votes received by each candidate. In accordance therewith, the chair announced the following officers elected: President, Henry J. Hartley; Vice-President, Silas G. Comfort; Secretary, L. F. Rondinella; Treasurer, George T. Gwilliam; Directors, for two years, Charles Hewitt, Thos. C. McBride, H. K. Myers.

On behalf of the retiring President, Mr. Schermerhorn thanked the Club for the courtesy accorded to him in the administration of his office, and introduced the new President, Mr. Henry J. Hartley. Mr. Hartley acknowledged the honor done him by election to the presidency, and pledged his best efforts for his term of office.

PERSONAL.

(For other personal metnoin see Elections and Appointments.)

—A brief sketch of the life of Mr. W. C. Brown, who has just been elected Third Vice-President of the New York Central & Hudson River, will be found in our issue of July 5, 1901, page 491.

—Mr. Herbert D. Bennett, at one time Assistant to the General Superintendent of the Pennsylvania Company (Southwest System) died suddenly at his home in Columbus, Ohio, Jan. 27. Mr. Bennett was born in Toledo, Ohio, Sept. 26, 1867.

—Mr. P. S. Blodgett, who becomes General Manager of the Lake Shore & Michigan Southern, succeeding Mr. Brown, was, in June last, appointed General Superintendent of the New York Central & Hudson River, at which time a brief sketch appeared and will be found on page 523.

—Mr. E. Ensign, District Manager of the American Car & Foundry Company, died at his home in Huntington, W. Va., Jan. 27, aged 61 years. Before the Ensign Manufacturing Company was sold to the American Car & Foundry Company Mr. Ensign was Treasurer of the former company. He was also at one time a Director of the Ohio River R. R.

—As we have already announced in the proper department of the *Railroad Gazette*, Mr. C. M. Mendenhall has resigned as Superintendent of Motive Power of the Chicago & Alton. The resignation took effect Feb. 1, and we learn that Mr. Mendenhall is available for a position. He is so well known to railroad officers that we need say nothing more about him.

—Mr. A. H. Smith's entire railroad career has, up to the present time, been with the Lake Shore & Michigan Southern. Mr. Smith now becomes General Superintendent of the New York Central & Hudson River. At the time Mr. Smith became General Superintendent of the Lake Shore we published a sketch of his life. This will be found on page 473, 1901.

—Mr. James Spear died in his home in Wallingford, Pa., Jan. 30. He was born in Mauch Chunk, Feb. 17, 1827. He is known to railroad men as the designer and patentee of a car heater which at one time had great use. He had carried on the stove business in Philadelphia for many years, and was a man of considerable fortune and pretty broad public interests.

—Mr. E. M. Collins, who recently succeeded Mr. Sweeney as General Superintendent of the Missouri, Kansas & Texas, is 38 years old. He has been in railroad service since 1880. From then until 1897, when he became Superintendent of Car Service, Mr. Collins has served in various capacities, holding such positions as telegraph operator, station agent and train despatcher.

—Mr. Arthur M. Parent, Manager of the car works of the Pullman Company, died suddenly at his home, Chicago, Feb. 2. He was 42 years old, having been with the company for more than 20 years. Until 1893, Mr. Parent was Assistant Manager of the Detroit Works, when he was transferred to a similar position in the car shops at Pullman. In 1896 he was made Manager of the Pullman shops.

—Mr. C. H. Quereau has resigned as Assistant Superintendent of Machinery of the Denver & Rio Grande, that office having been abolished in the re-arrangement of the organization. He will remain in service for a while, but is available for a position. Of course, it is not necessary for us to introduce Mr. Quereau to the readers of the *Railroad Gazette*, his energy, zeal and ability being known.

—Mr. Frank E. Prior, who was, on Jan. 7, transferred to Sacramento, Cal., as Division Superintendent of the Southern Pacific, was born Nov. 4, 1859, at East Hartford, Conn. In 1881 he was appointed a stenographer for the Gulf, Colorado & Santa Fe, but later went with the Southern Pacific in a similar position. In 1894 he was appointed Trainmaster and the following year became Assistant Superintendent of the Los Angeles Division, from which position he has just been transferred.

—Mr. J. W. Fogg, Master Mechanic of the Chicago Terminal Transfer, is 33 years old. At an early date he entered the service of the Great Western R. R. of Canada as a locomotive fireman and held a similar position on the Canada Southern and the Wisconsin Central, later becoming engineman on the Chicago Terminal Transfer. After serving in this capacity for 12 years he was appointed to the position of traveling engineer, and in October, 1901, became Acting Master Mechanic, from which position he has just been promoted to that of Master Mechanic.

—The new Engineer Maintenance of Way of the New York, Ontario & Western, Mr. C. E. Knickerbocker, was born Nov. 17, 1867. He is a graduate of Princeton, having graduated as a Civil Engineer with the class of '91. For four months he was in the City Engineer's office at Middletown, N. Y. He then became a draftsman in the Chief Engineer's office of the New York, Ontario & Western, and has continued with this company ever since, serving from March, 1893, to January of this year as Assistant Engineer of the Northern Division at Norwich, N. Y. Mr. Knickerbocker's headquarters are now at Middletown, N. Y.

—Mr. Charles J. Parker, the new Chief Engineer of the Rutland Railroad, was born at Adams Center, N. Y., in 1865. He was graduated from the Lehigh University in 1888 and was for three years (1889-1892) in the maintenance and construction department of the Lehigh Valley. In the last-named year he became Resident Engineer in charge of six miles of heavy railroad work (Clearfield to Curwensville, Pa.) for the Buffalo, Rochester & Pittsburgh. In 1896 he returned to the Lehigh Valley as Division Engineer, and for over three years (1898 to Jan. 20 this year) held a similar position on the New York Central & Hudson River at Watertown, N. Y.

—Mr. John R. Slack, whose promotion to the position of Superintendent of Motive Power of the Delaware & Hudson Company became effective on the first of January this year, is 39 years of age. He was a student at Columbia College and later at Stevens Institute of Technology. Mr. Slack's career as a railroad man dates from 1886, when he began as an apprentice in the shops of the New York Central & Hudson River. Four years later he became inspector of locomotives and Mechanical Engineer, and in 1899 he assumed the duties of Assistant Superintendent of Motive Power of the Delaware & Hudson Company, from which position Mr. Slack was recently promoted.

—The new Superintendent of the Amboy Division of the Pennsylvania Railroad, Mr. Victor Wierman, is a native of Pennsylvania, having been born at Towanda, Dec. 20, 1855. He was graduated from Lafayette Col-

lege in June, 1876, and between that time and November, 1878, was engaged in surveys for the Pennsylvania Canal Company, and was also for a short time with the Lehigh Valley. Mr. Wierman entered the service of the Pennsylvania in 1878 as Assistant Supervisor at New Brunswick, later becoming Supervisor. From then, until his new appointment as above, Mr. Wierman has held the positions of Assistant Engineer and Division Superintendent on various divisions, namely the Pittsburgh, Bedford, Lewiston and Frederick.

—Mr. H. J. Pfeifer, the First Assistant Engineer of the Terminal Railroad Association of St. Louis, was born Feb. 23, 1871, at St. Louis, Mo. He was graduated from the St. Louis University, B. A. degree, in 1899, and spent one year and a half in the Bridge Engineer's office as a rodman and draftsman. In 1891 Mr. Pfeifer took a position with the Scherpe & Koken Architectural Iron Works, now known as the Koken Iron Works, of St. Louis, Mo. In September, 1893, the engineering departments of the Terminal Railroad Association of St. Louis and the St. Louis Merchants Bridge Terminal Railway were consolidated and he became Draftsman for both companies. On Dec. 31, 1901, he received his new appointment as First Assistant Engineer and Acting Chief Engineer. Mr. Pfeifer is an Associate Member of the American Society of Civil Engineers, a member of the Engineers Club of St. Louis, and the St. Louis Railway Club.

—Mr. A. H. Thomas, recently appointed Mechanical Engineer of the Chicago, Milwaukee & St. Paul, was born Aug. 7, 1870, at Richmond, Ind., and in 1889 entered the service of the Pennsylvania Lines West as a clerk in the office of the Division Superintendent at Richmond. In the fall of 1892 he entered Purdue University, followed the course in Mechanical Engineering and graduated in June, 1895. Mr. Thomas again took service with the Pennsylvania as special apprentice at the Logansport (Ind.) shops, but was shortly after transferred to Columbus, Ohio, and made a special inspector, and a little later assistant on the staff of the Superintendent of Motive Power, Mr. S. P. Bush. In April, 1900, he was made General Foreman of the Locomotive Department at Dennison (Ohio) shops, and March 1 of the following year he left the Pennsylvania to accept a similar place at Chicago with the Chicago, Milwaukee & St. Paul. On Jan. 13 last, Mr. Thomas was promoted to his present place at West Milwaukee, Wisconsin.

—Mr. Edward Langford Adams, Assistant to the President of the Sargent Company, died of pneumonia at the home of his parents in Chicago Friday morning, Jan. 31. Mr. Adams was born in Philadelphia in 1875, and was only 26 years old at the time of his death. In many respects he was typical of the young technical men who are so rapidly making their way to the front ranks, and his untimely death is deeply regretted by all who knew him. He graduated in 1896 from the University of Illinois with the highest honors, and immediately upon leaving the University entered the Chicago office of the late David L. Barnes, Consulting Engineer. Upon the death of Mr. Barnes the following year Mr. Adams was employed by the Sargent Company, Chicago, as draftsman, and was also put in charge of its testing department, remaining in the service of this company until his death. Subsequently, he was made Mechanical Engineer; then Assistant Superintendent in charge of the Open Hearth Department, and quite recently was made Assistant to the President of the company, supervising all mechanical matters at both the Fifty-ninth street and the Chicago Heights plants. To Mr. Adams' efforts the officers of the Sargent Company credit a large part of their recent success, and at the time of his death his prospects were exceedingly bright for a successful career as an engineer and as a business man.

ELECTIONS AND APPOINTMENTS.

Alabama Great Southern.—The jurisdiction of the following officers of the Cincinnati, New Orleans & Texas Pacific (Queen & Crescent) have been extended over the A. G. S.: G. B. Nicholson, Chief Engineer; J. P. McCuen, Superintendent of Motive Power; I. F. Hall, Superintendent Car Service; W. C. Rinearson, General Passenger Agent; A. Telford, Purchasing Agent, and G. L. Lang, Superintendent of Telegraph, all with headquarters at Cincinnati, Ohio, except Mr. Lang, who will be located at Chattanooga, Tenn. Messrs. Rinearson, Telford and Lang succeed S. H. Hardwick, J. P. Minetree and C. A. Darlton, respectively. The offices of General Superintendent, Traffic Manager, Assistant Passenger Traffic Manager, Assistant General Passenger Agent, and Superintendent of Tests of the A. G. S. have been abolished. Edward Colston has been appointed Assistant General Counsel, succeeding W. A. Henderson, resigned.

Atchison, Topeka & Santa Fe.—A. G. Wells, heretofore General Superintendent of the "Santa Fe Coast Lines," has been appointed General Manager of the same lines, succeeding the late Mr. Nevin.

Burlington & Missouri River in Nebraska.—J. E. Buckingham has been appointed Assistant General Passenger Agent, succeeding Arthur B. Smith.

Burlington, Cedar Rapids & Northern.—D. W. Albright has been appointed Purchasing Agent, succeeding W. J. Morrison, resigned.

Chicago, Burlington & Quincy.—Owing to ill health James C. Peasley, Vice-President and Treasurer, has resigned, and T. S. Howland, formerly Secretary, with headquarters at Boston, Mass., succeeds Mr. Peasley. Hereafter Mr. Howland's headquarters will be in Chicago.

Chicago, Rock Island & Pacific.—At a meeting of the Directors, held recently, G. G. McMurtry, F. L. Hine and F. S. Wheeler were elected Directors, succeeding H. R. Bishop, T. Dows and F. H. Griggs.

Choctaw, Oklahoma & Gulf.—H. G. Clark, heretofore General Superintendent of the Missouri Pacific, has been appointed General Manager of the C., O. & G., with headquarters at Little Rock, Ark. It is understood Henry Wood will become Chairman of the Board. W. S. Scott has been appointed Superintendent of Telegraph. This is a new position recently created.

Cincinnati, Georgetown & Portsmouth.—W. R. Todd has been elected Vice-President, succeeding C. C. Tennis.

Cincinnati Northern.—P. A. Hewitt has been appointed Auditor, succeeding H. A. Keller, assigned to other duties.

Coahuila & Zacatecas.—N. Kennedy has been appointed General Manager, with headquarters at Saltillo, Mex.

Colorado & Southern.—Thomas Paxton, heretofore Master Mechanic of the Gulf, Colorado & Santa Fe, has been appointed Superintendent of Motive Power of the C. & S., with headquarters at Denver, Colo., succeeding A. L. Humphrey.

Denver & Rio Grande.—J. J. Burns, Superintendent of the First Division, has resigned.

Erie.—James Corbett, heretofore Acting Division Superintendent, has been appointed Superintendent of the Susquehanna Division, succeeding G. A. Coe, deceased.

Lake Shore & Michigan Southern.—P. S. Blodgett, heretofore General Superintendent of the N. Y. C. & H. R., has succeeded Mr. Brown as General Manager of the L. S. & M. S. (See New York Central & Hudson River.)

Little Rock & Hot Springs Western.—H. E. Martin has been appointed General Superintendent and G. W. Thomas becomes General Passenger Agent.

Macon, Dublin & Savannah.—E. E. Williamson has been appointed Traffic Manager, with headquarters at Macon, Ga.

Mexican National.—F. B. Drake has been appointed by the readjustment managers to report on the progress of work of construction and on the application of the funds raised, to the work for which they are intended and the relation between the cost of the work actually expended and the estimated cost.

Missouri, Kansas & Texas.—J. A. Davis has been appointed Division Superintendent at Parsons, Kan., succeeding L. W. Welch, assigned as General Agent at Parsons. N. J. Finney succeeds Mr. Davis as Division Superintendent at Sedalia, Mo., and Mr. Finney, in turn, is succeeded by E. J. Lampert as Division Superintendent at Franklin Junction, Mo.

Missouri Pacific.—D. Hardy, heretofore Division Superintendent at Sedalia, Mo., has been appointed General Superintendent, with headquarters at St. Louis, Mo., succeeding H. G. Clark, resigned. (See Choctaw, Oklahoma & Gulf.)

New York Central & Hudson River.—W. C. Brown, heretofore Vice-President and General Manager of the Lake Shore & Michigan Southern, has been elected Third Vice-President of the N. Y. C. & H. R. A. H. Smith, heretofore General Superintendent of the L. S. & M. S., has been appointed General Superintendent of the N. Y. C. & H. R., with headquarters at New York City, succeeding P. S. Blodgett. (See Lake Shore & Michigan Southern.) G. H. Haselton has been appointed Division Superintendent of Motive Power, with headquarters at West Albany, succeeding the late Angus Brown. John Howard succeeds Mr. Haselton as Division Superintendent of Motive Power at Depew, and Mr. Howard, in turn, is succeeded by E. A. Walton as Division Superintendent of Motive Power at Corning, effective Feb. 5. Mr. Walton was heretofore Master Mechanic of the River Division. Since Feb. 1 the supervision of air-brake service, and instruction of employees in the use and care of air-brakes, has been divided under two Supervisors. E. Burgess will act as Supervisor of Air-Brakes for the Western, Rome, Watertown & Ogdensburg and Pennsylvania Divisions, with headquarters at Depew Shops; and W. H. Foster will act as Supervisor of Air-Brakes for the Middle and Hudson Divisions, at West Albany shops.

M. Edward Egan has been appointed Supervisor of Track, with headquarters at Peekskill, N. Y., succeeding W. H. Van Wie, resigned. Thomas R. Burke has been appointed Supervisor of Track, at Oswego, N. Y., succeeding Mr. Egan. Effective Feb. 1.

New York, Chicago & St. Louis.—James Webster has been appointed Assistant General Freight Agent, with headquarters at Cleveland, Ohio.

Norfolk & Western.—A. P. Carter has been appointed Claim Agent, with headquarters at Roanoke, Va., succeeding D. H. Barger.

North Shore.—J. A. Fillmore, formerly Manager of the Southern Pacific, has been appointed General Manager of the N. S.

Pennsylvania.—The following appointments have been made: R. L. Roe, heretofore Supervisor of the Monongahela Division, becomes Assistant Engineer of the Schuylkill Division, succeeding W. L. Cooper, transferred; E. E. Lippincott becomes Supervisor at Huntingdon, Pa., succeeding Mr. Roe, and Mr. Lippincott, in turn, is succeeded by G. C. Koons, Supervisor at W. Brownsville, Pa.; L. T. Ford becomes Assistant Engineer of the Philadelphia Division, succeeding J. B. Baker, Jr., and C. C. Anthony becomes Superintendent of Signal Service on the Altoona Division.

Pittsburgh & Lake Erie.—W. M. Doulin has been appointed Assistant Secretary and Treasurer, and E. H. Kennedy becomes Assistant Auditor.

Pittsburgh & Western R. R.—The officers of this company are: President, William M. Kennedy; Secretary, C. W. Woolford, and Treasurer, J. B. McNeal. Directors, including the above-mentioned, are: H. W. Oliver, W. R. Woolford, T. J. English, John E. McVay and J. L. Kirk. (See R. R. Construction column.)

Toledo, St. Louis & Western.—T. J. Cook, Assistant General Freight Agent, will assume the duties of General Passenger Agent also.

Union Tank Line.—Taking effect immediately, Charles M. Bloxham has been appointed Master Car Builder, succeeding C. A. Smith, who becomes Consulting Engineer. Mr. Bloxham's headquarters will be at 26 Broadway, New York City.

West Jersey & Seashore (Pennsylvania).—A. J. Cassatt was, on Jan. 31, elected President of the W. J. & S., succeeding the late W. J. Sewell.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALASKA, COPPER RIVER & YUKON.—This company has been incorporated under the laws of Washington, to build a railroad from Prince William's Sound, Alaska, to a point on the Yukon, near Eagle. E. D. Bannister and A. B. Iles are incorporators.

ARKANSAS VALLEY & WESTERN.—This company has recently been chartered in Oklahoma, to build a road from a point near Sapulpa, Ind. T., by way of Pawnee and Perry to Enid, Okla. T., a total of about 150 miles, with chief place of business at Perry. Names of incorporators not stated.

BINGHAMTON, TOWANDA & WESTERN.—This company has been incorporated in Pennsylvania, with a capital stock of $1,000,000, to build a railroad 90 miles long from a connection with the Northern Central at a point near Ralston, Lycoming County, Pa., to a point on the New York State Line near the Choconut Creek, Susquehanna County.

BLOOM RUN.—This company was incorporated in Pennsylvania, Jan. 23, with a capital stock of $40,000, to build a railroad four miles long from a point near Stronach Station, on the Tyrone & Clearfield, to a point near Blooms Post Office, Clearfield County, Pa. John E. Evans, Ebensburg, Pa., is President.

BRUCE MINES & ALGOMA.—Application has been made to the Ontario Government for a subsidy of $3,000 per mile for a further extension of the company's line, 15 miles long.

CAPE BRETON.—This company has advised the council of Sydney, N. S., that, in addition to building a branch from Louisburg to Sydney, about 35 miles distant, it is proposed to extend the road to North Sydney, five miles beyond.

CENTRAL ONTARIO.—Announcement is made that this railroad, now operating 125 miles of track between Coe Hill and Pictou, Ont., will extend from Bancroft to Caldwell, Ont., 60 miles.

CHICAGO, MILWAUKEE & ST. PAUL.—An officer denies current press reports that an extension is contemplated northwest from Eureka, S. Dak.

CHICAGO, ROCK ISLAND & TEXAS.—An officer writes that surveys are being made on the proposed line from Jacksboro to Graham, Texas, 30 miles. No information as yet available as to when contracts are likely to be let.

CHIHUAHUA ROADS.—It is reported that a railroad 40 miles long is to be built from the mines at Galvana to Reduction Works. Col. M. B. Place, of El Paso, Texas, is interested.

CHOCTAW, OKLAHOMA & GULF.—It is said that the proposed extension of this company's line in Oklahoma to Guthrie will be built at once, as the $60,000 bonus asked has been raised. Work is to be begun at each end of the line, which is expected to be in operation next summer. (Dec. 20, 1901, p. 883.)

COAST YUKON.—Application is being made to the Dominion Parliament for an act of incorporation of a railroad to be built from a point at or near Kitimaat Inlet, on Douglas Channel, and from a point on the Yukon River, and thence by the most feasible route to Dawson.

COLUMBIA & ST. LOUIS.—Incorporation has been granted in Missouri for a new line 24 miles long, with the above title, to run from Columbia, Mo., to a junction with the Wabash at Centralia. Bryant C. Winston, E. T. Clapp and others are interested.

COLUMBIA RIVER & NORTHERN.—Articles of incorporation were filed at Portland, Ore., Jan. 23, by the above company, which proposes to build between Lyle and Goldendale, Ore., 30 miles, and also to operate steamboats on the Columbia and Willamette rivers between Portland and Lyle, 10 miles below The Dalles. C. A. Dolph, Rufus Mallory and others are interested.

DAYTON & XENIA TRANSIT.—It is said that this electric line in Ohio, successor to the Dayton & Xenia Traction and Rapid Transit Companies, will build an extension, 28 miles long, southeast from Xenia to Washington. Rights of way are reported secured by A. W. Anderson, Superintendent.

DELAWARE VALLEY (ELECTRIC).—This company will, it is said, build extensions from its present terminus at Bushkill, Pa., to Port Jervis, N. Y., 27 miles, and from Stroudsburg to Saylorsburg, Pa., 12 miles. The line was reported building last spring between Stroudsburg and Bushkill, Pa., 13 miles, and is now operated as far as Shoemakers, 11 miles. F. W. Coolbaugh, Easton, Pa., is President.

DETROIT MANUFACTURES.—This company has filed articles of incorporation in Michigan, with a capital stock of $300,000 for the purpose of building a line from Orleans street, through Guion and Wight streets to the Belle Isle bridge in the city of Detroit, a distance of about one and three-quarter miles. The incorporators are: J. C. Donnelly, Solon Burt, M. B. Mills, W. T. Barbour, W. C. McMillan, J. H. Harris and H. J. Lyster, all of Detroit.

EAU CLAIRE, CHIPPEWA FALLS & NORTHWESTERN.—Articles of incorporation were filed by this company in Wisconsin, Jan. 15, with capital stock of $50,000. It is proposed to build from Eau Claire to Little Falls, 28 miles, and to run the line as a spur of the Chicago, St. Paul, Minneapolis & Omaha. The incorporators are W. A. Scott, J. O. Clark and others.

EL PASO & NORTHEASTERN.—An officer writes that connection between the Carrizozo-Santa Rosa line, 128 miles, and the Chicago, Rock Island & Pacific, was to have been made Feb. 1. It has been built by Good & Co., of El Paso, contractors. The proposed extension from Tucumcari, N. Mex., to Dawson, N. Mex., 133 miles, has been let to the same firm, and 20 miles of grading is completed. (Nov. 1, 1901, p. 764.)

ERIE.—It is said that $500,000 is to be spent on yard improvements in Cleveland. A tract of 180 acres of land at Randall has been purchased, in which yard, when completed, all incoming freight will be classified.

FISH RIVER.—An officer writes that surveys are completed on this new line in Maine from Ashland to Fort Kent, via Portage Lake, etc., 52 miles. Contracts have been let to A. E. Trites, general contractor, and ledge work, clearing, and masonry work are now in progress by a force of 250 men. The work is mostly light, with the exception of four miles, and the maximum grade will be 1 per cent. There will be three iron or steel bridges on the line, respectively 800, 375 and 300 ft. long. Rails and rolling stock have been purchased. F. H. Cram, President, Bangor, Me.

FREMONT, ELKHORN & MISSOURI VALLEY.—The location of the extension north and west from Verdigris, Neb., is reported complete for 70 miles. The contract has been let to Winston Bros., of Minneapolis, with the expectation that the line will be running next fall.

GRAND RAPIDS, GRAND HAVEN & MUSKEGON (ELECTRIC).—This new line in Michigan was opened for traffic between the cities named, 34 miles, on Jan. 23. Express cars as well as passenger cars will be run and the distance was covered in 61 minutes on the opening trip.

GREAT NORTHERN.—Surveys are reported in Montana for the projected cut-off from Kalispell, Mont., on the line of the Great Northern, to a point on the Northern Pacific west of Missoula, presumably Jocko, Mont.,

about 65 miles south. It is thought that plans will be completed and bids let in March (Sept. 13, 1901, p. 644.)

Gulf, Colorado & Santa Fe.—An officer writes that surveys are complete and work is in progress on an extension 55 miles in a northerly direction from Roganville, Jasper County, Texas, to San Augustine, passing through Jasper and Brookland, and 10 miles west of Hemphill. The contract has been let to the Old Colony Construction Co., Houston, Texas, and two-thirds of the work is completed. There are no iron bridges or long trestles on the line. The maximum grade is .9 per cent., and the ruling curve 6 deg. W. C. Nixon, Galveston, Texas, is General Manager.

Gulf of California & Yuma.—An officer writes that this projected line from San Jorge Bay, on the Gulf of California, to Yuma, Ariz., 182 miles, with extension from Yuma to Phoenix, Ariz., is surveyed, and that track is being laid on the section from San Jorge Bay to Sierra Pinto, Sonora, Mex., of which 13 miles is now in operation. Additional contracts to be let before long. McPherson & Co., San Jorge Bay, Sonora, Mex., contractors. Capt. Alfonso B. Smith, Yuma, Ariz., is President.

Kansas City, Mexico & Orient.—Grading is reported complete on 140 miles of this new line in Mexico, which is being built by A. E. Stilwell. Rails for this extension have been shipped to Topolobampo from Belgium. Besides the grading of the west end of this line, 40 miles have been graded eastward from Chihuahua, 70 miles have been graded in Texas, 40 miles in Oklahoma and 70 miles in Kansas without the issuance of bonds. It is said that the chief revenue from the sale of stock has been derived in Europe.

Kishacoquillas Valley.—An officer writes that the extension from Reedsville, Pa., to Lumber City is completed, and that preliminary surveys have been made of an extension from Belleville, Pa., to McAlevy's Fort, by way of Greenwood, a total of about 12 miles, in Mifflin and Huntingdon counties, Pa. Various betterments of the line have also been made.

Marinette, Tomahawk & Western.—An officer writes that contracts for grading the new extension, 12 miles south from Gleason, Wis., have been let to Kimball & Willis, Merrill, Wis., and that the grading is half completed. Track has been laid for two miles. There are no bridges, trestles or tunnels, and no new rolling stock will be required. C. H. Grundy, Tomahawk, Wis., Superintendent.

Mason City & Fort Dodge.—An officer writes that 101 miles of this projected line in Iowa is under contract to P. E. Strugart, McArthur Bros., and Winston Bros. The remainder of the 134 miles projected, which is the section from Harlan to Council Bluffs, Iowa, 33 miles, will probably be let this month.

Mexican Central.—The Mexican Government has granted a concession for a line from Torreon to Trevine, 160 miles. Connection will be made at Torreon with the main line, and at Trevine with the Monterey & Mexican Gulf. The Mexican National will be paralleled by the new line for the entire distance between the points named. Surveys are reported.

Mexican Eastern.—This company has been incorporated in Delaware, with a capital of $5,000,000, to build a railroad from Merida, Yucatan, to Zacoalco, Vera Cruz and the City of Mexico.

Middlesboro Mineral.—Work was reported begun, Jan. 16, on this new road in Kentucky, which is to be built into the mountains, in Bell County, to develop coal lands. The projected length is eight miles, with probability of adding several branches later. J. H. Bartlett, Middlesboro, Ky., is President.

Mississippi, Arkansas & Western.—The Arkansas Board of Railway Incorporators chartered, Jan. 21, a railroad to be built in Drew and Chicot counties, from a point on the bank of Bayou Bartholomew through Blissville to Gaines Landing, on the Mississippi. E. G. Leszynsky, of Blissville, Ark., owns practically all the stock. The length of the projected line is 22 miles.

Missouri, Kansas & Texas.—Surveys are reported on the projected extension from Wybark, Ind. T., 80 miles up the Arkansas Valley to Guthrie, Okla. T. (Jan. 10, p. 32.)

Nashville & Northeastern.—Charter has been granted this company in Tennessee with $10,000 capital stock, to build from a point on the Tennessee-Kentucky State line southwest of Albany, Ky., in Pickett County, through Pickett, Clay, Macon, Trousdale and Sumner Counties to Gallatin, about 75 miles distant. The company's office is at Celina, Tenn., and the incorporators are Guy M. Mallon, S. Woodward, L. F. Hubble, J. M. Logan and C. M. Patterson.

Nashville, Chattanooga & St. Louis.—An officer writes that the Bon Air extension, from Bon Air, Tenn., to the Chestnut Ridge mines of the Bon Air Coal Co., 7½ miles, is now under way; and that Brooks Bros., of Bon Air, Tenn., the contractors, are working on the 2½-mile section from the top of Cumberland Mountain; 125 men and 25 teams are at work. (Nov. 15, 1901, p. 798.)

New York, New Haven & Hartford.—Contract for the cut-off 4½ miles long from North Attleboro, Mass., to a point near Adamsdale, on the line of the Rhode Island & Massachusetts, has been let to C. W. Blakeslee & Sons, of New Haven, Conn. A double track is to be built, at an estimated cost of $150,000, and it is thought that the work will be completed in 10 months. (Nov. 15, 1901, p. 798.)

Norfolk & Western.—Surveys are reported in West Virginia for this company's proposed extension from Wangatuck to Kenova Bridge, 70 miles.

Oregon Short Line.—An officer writes that the 86-mile extension between Blackfoot, Idaho, and Mackay, by way of Arca, Lost River and Houston is completed. It is also proposed to build an extension on from Mackay to Challis, Idaho, 60 miles; this has been surveyed, but no decision in regard to building has as yet been made. The corporate name of this line is the Salmon River R. R. (Jan. 7, p. 50.)

Osceola, Montegaw Springs & Western.—This company was chartered in Missouri, Jan. 25, with a capital of $100,000, to build a steam railroad 10 miles long in St. Clair County, Mo., between Osceola and Montegaw Springs. G. A. Williams, of Osceola, is interested.

Peekskill Lighting & R. R.—Franchise has been asked for an electric road from Montrose, N. Y., via Oscawana Station, Crugers, Boscobel and Croton, to the Ossining town line, a total distance of about 12 miles.

Pennsylvania.—Work on the track elevation at Wilmington, Del., began Jan. 25. The estimated cost of the work is $3,000,000.

Pennsylvania Roads.—Preliminary surveys are reported completed for a railroad to be built by the Union Tanning Co. through its hemlock properties in Lycoming, Sullivan and Bradford Counties, Pa., a total of about 80 miles. The route starts at Marsh Hill, on the Northern Central, 14 miles north of Williamsport, and ends at a junction with the Barclay R. R. in the southwestern part of Bradford county.

Phoenix & Eastern.—An officer writes that preliminary surveys for this new line in Arizona, from a junction with the Santa Fe, Prescott & Phoenix, are completed and that location is in progress. Announcements

as to the laying of tracks will be made after the survey is completed. F. M. Murphy, Phoenix, Ariz., is President and W. S. Drake is Chief Engineer. The accompanying map shows the projected route.

Rochester, Syracuse & Eastern (Electric).—At a recent meeting of business men in Syracuse, N. Y., $800,000 was subscribed towards this new electric line between Syracuse and Rochester. The approximate distance is 100 miles, in a thickly settled locality. Lyman C. Smith, of Syracuse, is President. (Nov. 15, 1901, p. 798.)

Saline River.—An officer writes that in addition to the extension from Draughon, Ark., to New Edinburgh, nine miles, which has been for some time under consideration, it is proposed to build 10 miles south from New Edinburgh, on a route which has been partly surveyed. It is thought that this will be built during 1902. C. J. Carter, Kansas City, Mo., is President and General Manager.

Sherman & Northern.—An officer writes that surveys have been made for this projected line in Texas from Sherman about 30 miles north to a point on Red River. Nothing has as yet been done beyond this.

Southern Pacific.—Contracts for improving the Central Pacific are reported let as follows: From Vista to Wadsworth, Nev., 25 miles, to Kirkpatrick Bros. & Collins; stretch of track 45 miles long, east of this, to E. B. & A. L. Stone, Oakland; next 16 miles east, to Corey Bros., of Ogden, and, rebuilding six miles in Palisade Canyon, to Erickson & Patterson, of San Francisco. It is said that bids will be asked before long on the Ogden-Lucin cut-off. (Jan. 17, p. 50, and Sept. 13, 1901, p. 644, illustrated.)

Temiscamingue.—The Ontario Government has announced its intention of building this branch line from North Bay, Ont., 105 miles north to a point on Lake Temiscamingue. It is provided that not more than 20,000 acres of land may be set apart for each mile built, proceeds from the sale of which will be applied towards payment of the sinking fund and interest of the debentures issued by the Government Commissioners appointed. The Chairman of this Commission will be Robert Jaffray. (Dec. 6, p. 850.)

Texas Short Line.—An officer writes that 10 miles of grading have been completed on this new line in Texas from Grand Saline, northeast 10 miles to Alba, and that track laying has begun. It is also proposed to build a branch from Alba to Quitman, 14 miles. H. M. Strong, of Grand Saline, Texas, is President, and R. S. Weitzell, Chief Engineer.

Washington Street Subway (Boston).—The bill for this projected subway in Boston under Washington street, from Broadway to the North End, has been submitted to the Massachusetts Legislature. Provision is made in great detail for the various points to be settled, and, among other things, it is specified that the City of Boston shall issue $6,000,000 40-year bonds to cover the cost; that the subway, when completed, shall be leased to the Boston Elevated for not more than 20 years at a rental of 4⅞ per cent. per annum on cost of building; that the subway, when built and while under lease shall be under control of the Railroad Commissioners, and that the Act shall be submitted to the voters of Boston at the municipal election of 1902.

White River.—Track laying began, Jan. 21, on the first 20 miles of this new line in Arkansas. Work is in progress at the Batesville end. (Dec. 27, 1901, p. 900.)

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The gross earnings of this company for the six months ending Dec. 31, 1901, were $30,876,256, as against $26,946,616 for the same period last year; an increase of $3,929,640. This was on an increase in average operated mileage of 45 miles. The operating expenses during the period increased $468,271, leaving income from operation after deduction of operating expenses and taxes, $12,526,799, as against $10,772,000 in 1900, an increase of $2,519,726.

Atlantic Coast Line Electric.—Application to have a receiver appointed has been made, at Asbury Park, N. J. The company operates 24 miles of electric line, including that leased, in the vicinity of Asbury Park. The applicants claim that the company has been running at a loss and that interest and taxes remain unpaid.

Detroit Southern.—This company has bought control of the Iron R. R., extending from Ironton to Center, Ohio, 13 miles, with branches which bring the total mileage to 20.

Eastern Ohio Traction.—At a joint meeting of stockholders, Jan. 20, it was voted to merge the Cleveland & Eastern, Cleveland & Chagrin Falls and Chagrin Falls & Eastern electric lines under the above title. The company will have a capital stock of $2,500,000, and bonds for a similar amount. Building and extension of the properties named is in progress, and 75 miles are in operation.

Erie.—Gross earnings for the six months ending Dec. 31, 1901, were $21,322,545, an increase of $1,988,606 over the year previous. After deducting working expenses, the net earnings for the period were $6,603,253, as against $5,380,576 in 1900. During the month of December there was a marked decrease in gross earnings and an increase in working expenses, owing to a flood which interrupted the traffic for several days, so that the figures for December alone show a decrease of $118,163 in net earnings from December, 1900.

Franklin & Abbeville.—This road, operated in connection with the Caffery Central Sugar Refining Co.'s plant, Franklin, La., was placed in the hands of a receiver Jan. 21 by order of Judge Parlange, in the United States Court at New Orleans.

Great Northern of Canada.—Rudolph Kleybolte & Co., New York, offer at 100 and interest $3,000,000 first mortgage, 50-year, sinking fund gold 5s, due Jan. 1, 1950. This is the balance of a total issue of $4,040,000, issued at $20,000 per mile on 177 miles of completed road, with an additional $500,000 issued on account of the Hawkesbury Bridge. The company's bonded debt consists of $3,540,000 first mortgage 5s, series A; $500,000 first mortgage 5s, series B, and $44,000 Quebec Terminal 5s; $350,000 car equipment bonds, which are a lien on the equipment, have also been issued, but these are further secured by $300,000 of the first mortgage railroad bonds.

Gulf & Brazos Valley.—This company has entered into a contract with the Weatherford, Mineral Wells & Northwestern, whereby it secures trackage rights over the latter's rails into Weatherford, Texas. The Texas Railroad Commission has approved the contract.

Hilo.—This company has placed $300,000 6 per cent. bonds at par, it is reported, in San Francisco. A new extension, in Hawaii, is building.

Indiana, Decatur & Western.—This company has filed a mortgage to secure an issue of $596,000 bonds, the proceeds of which are to be applied to the Decatur & Springfield branch, a new extension. A line 153 miles long between Indianapolis and Decatur is now in operation.

International & Great Northern.—Application has been made to the New York Stock Exchange to list $740,000 additional first mortgage gold 6s, and $740,000 additional second mortgage gold 5s.

Kansas City, Watkins & Gulf.—Foreclosure sale of this property is advertised to take place on Feb. 24, at Lake Charles, La. There are at present 98 miles of railroad in operation, with two short branches. A. H. Leonard is Special Master.

Lehigh Valley.—The comparative statement for the month of December, 1901 and 1900, shows that gross earnings decreased in 1901 from $2,206,440 to $1,937,400. Expenses slightly increased, with the result that net earnings decreased from $444,504, in December, 1900, to $104,742, in 1901. This is exclusive of the Coal Company, which showed a slight improvement.

Los Angeles & Redondo.—A bond issue of $500,000 was authorized by the stockholders on Jan. 3, for the purpose of changing the equipment of the road from steam to electricity. The road is 18 miles long, between the points named in California, and has $500,000 stock outstanding, but no bonds.

Nashville & Knoxville.—Notice is given that a special meeting of stockholders will be held at Lebanon, Tenn., Feb. 18, to consider the sale or lease of the Nashville & Knoxville to the Tennessee Central, or to any other connecting road. The N. & K. runs from Lebanon to Monterey, Tenn., 79 miles, with a branch eight miles long. H. A. Crawford, St. Louis, Mo., is President.

Oklahoma & Texas Southern.—Application has been made to the Texas Railroad Commission for authority to issue $2,000,000 of bonds, in connection with the proposed extension from Spanish Fort to Stephenville.

Pennsylvania.—Gross and net earnings, during the month of December, decreased from December, 1900, on all the main divisions reported except the Lines West, and on all of the five divisions, i.e., the Lines Directly Operated, P. W. & B., Northern Central, W. J. & S., and Lines West, the expenses increased, except on the Northern Central, where they decreased $3,600. During the past year, however, gross earnings, expenses and net earnings all showed a substantial increase, on all five divisions, with the single exception of net earnings on the West Jersey & Seashore, which decreased $15,300 from the figure for 1900. The total gross earnings increased over $14,000,000 from 1900, with an increase in net earnings of over $7,000,000.

Pittsburgh & Western.—This property was, on Jan. 28, turned over to a company organized to operate it. Although virtually owned by the Baltimore & Ohio, it is under a different State charter from this company, and hence must be operated as a Pennsylvania State organization. The name will henceforth terminate in Railway, instead of Railroad. A list of the new officers is given under Elections and Appointments.

St. Lawrence & Adirondack.—It is now definitely announced that this company has purchased control of the Canada Atlantic, operating 466 miles of road, the main line of which extends from Depot Harbor, Ont., to Swanton, Vt. This gives a short grain haul to Boston, and enables the traffic to be advantageously shifted from Quebec and Montreal, in the summer time, to Boston, in the winter.

Utica & Mohawk Valley Electric.—At a meeting of the stockholders, Jan. 22, it was voted to increase the capital stock from $461,237 to $3,100,000, of which $600,000 is preferred.